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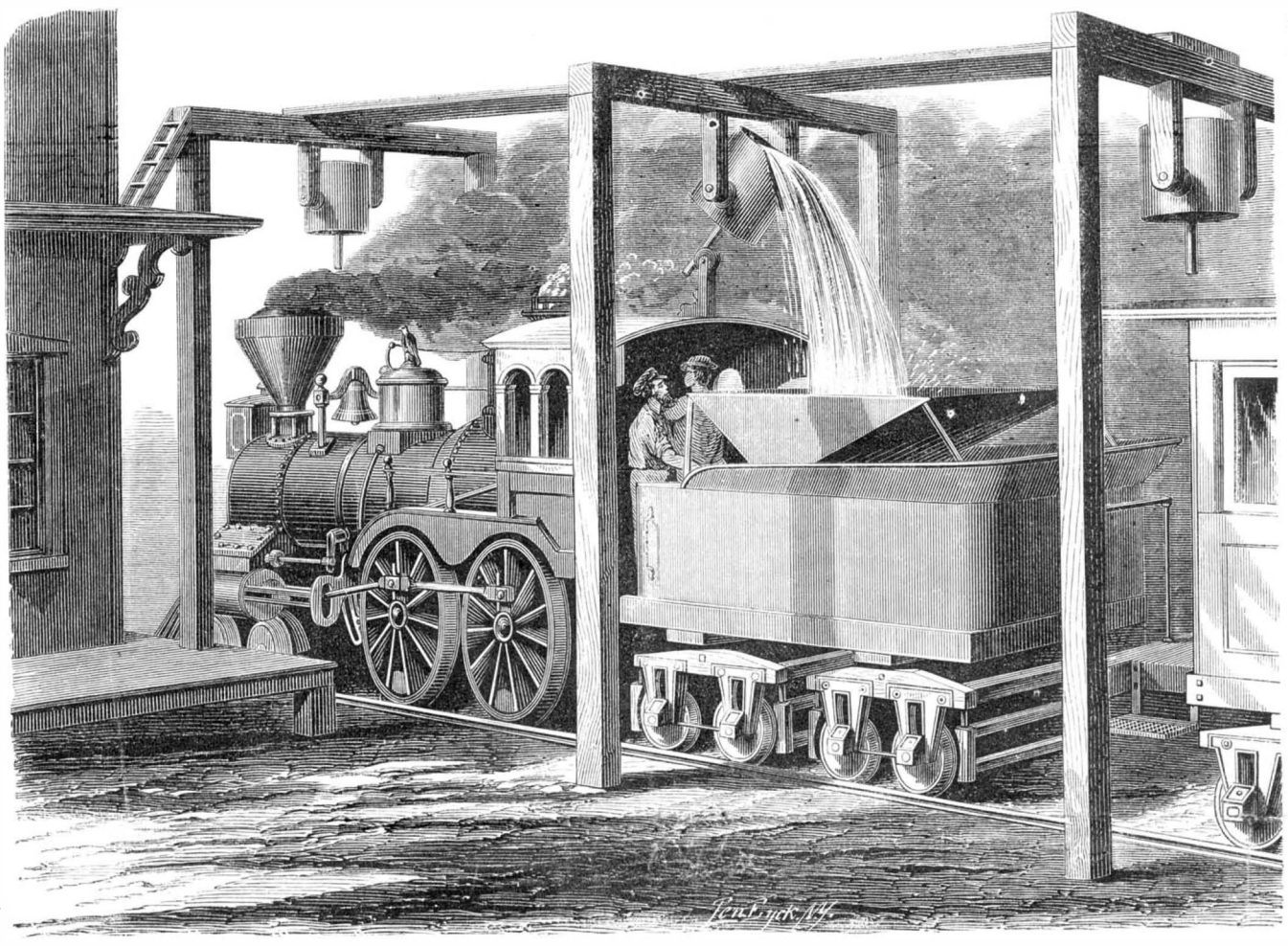
Improved Railway Supply Apparatus.

With fast running trains much time is lost in stoppages for water and fuel. The annexed engraving represents an apparatus designed to not only obviate the loss of time for taking in water and fuel, but to enable anything, as mails, express packages, etc., to be supplied to trains while running at full speed.



HARRISON'S WATER AND FUEL SUPPLY APPARATUS.

A frame work made by posts and cross beams, connected by a longitudinal girder, is erected over the track at the station from which supplies are to be taken. From each of the cross beams project downwards two arms, and between these arms is pivoted a tripping bucket of large size. The pivots are so placed that the buckets hang in a vertical position, but are so nearly balanced, when charged with water or coal, that a slight force will invert them. From the bottoms of the buckets project downward tripping arms, which, upon the passage of the locomotive, are struck by a vertical post on the top of the locomotive, attached at a suitable distance forward of the tender; this distance varying with the speed at which the train is designed to move.

The vertical post on the locomotive has a rubber buffer at the top to lessen the percussive force of its contact with the tripping arms of the buckets.

The longitudinal girder which joins the cross beams should be made of plank and sufficiently wide to constitute a walk for the attendants who fill and take care of the buckets. A hose may be employed for conveying water to the buckets, and an elevator for raising coal to the level of the buckets.

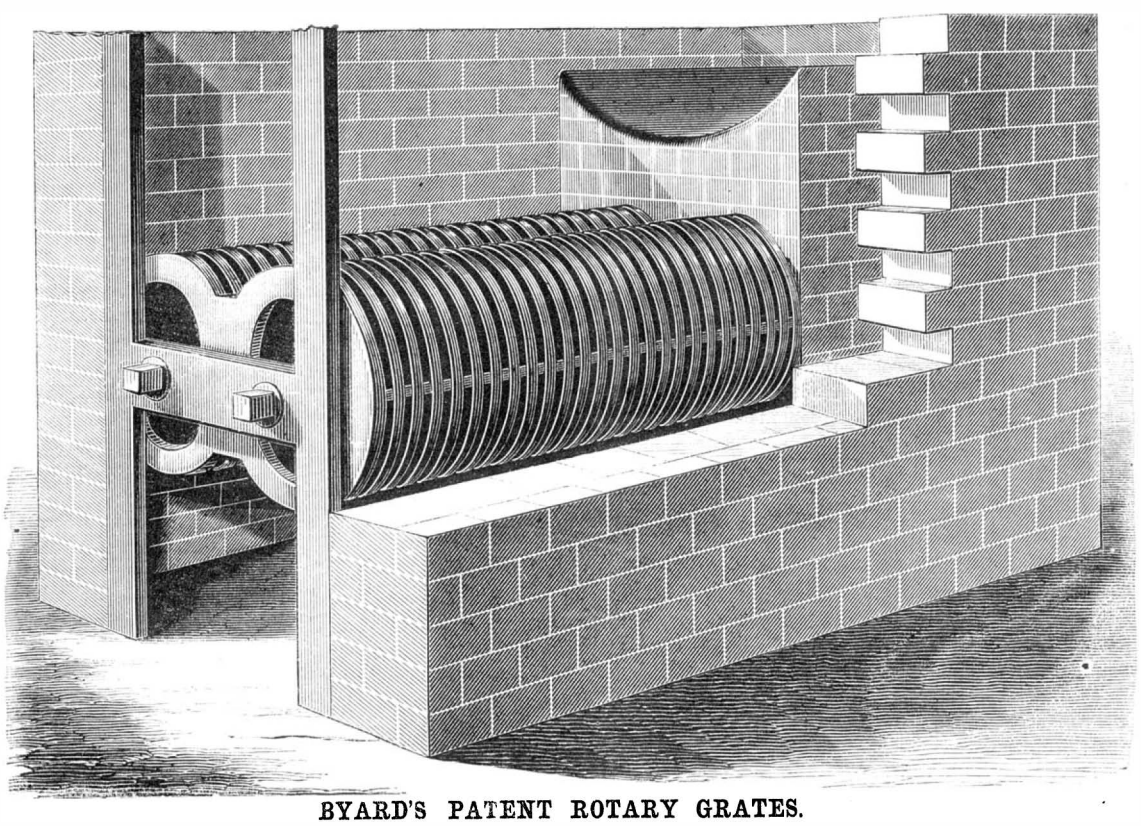
The tender is provided with a properly constructed hopper to receive the charge of fuel, water, or other material from the buckets.

This invention is very simple, and is much cheaper than some methods hitherto successfully employed to supply water to locomotives; while it is equally applicable to the supply of fuel or the other purposes above specified.

Patented in this country November 2, 1869, and also in Europe, through the Scientific American Patent Agency, by David Harrison, of Fayette, Miss.

Improved Rotary Grates.

Our engraving represents an improved form of rotary grate, the construction of which is so plainly delineated by our artist as to render a description almost unnecessary. It may be described, however, as a series of rings connected by longitudinal bars and arranged parallel to each other at right angles to a longitudinal shaft; this shaft serving to support the grate in the furnace, as shown.



BYARD'S PATENT ROTARY GRATES.

These grates have been subjected to a year's severe test in the foundery of Joseph King & Co., at Sharon, Pa., and the results of these experiments have, we are assured, established the following important claims:

First. On a stationary grate the fire rests constantly on one portion of the bar, which, as a consequence, becomes overheated and warps; while, with the rotary bar, a revolution can be made which turns the heated portion of the bar away from the fire, and, at the same time thoroughly rakes the fire.

Second. In raking the fire, when stationary grates are used, the doors of the furnace must necessarily be left open, for a time admitting the influx of cold air to the bottom of the boiler, and thus impairing the power of the steam. This is entirely obviated by the use of the rotary grates.

Third. They are claimed to last from four to six times longer than any other bar now in use.

Fourth. A much better draft is claimed, and it must be obvious that a greater extent of grate surface is secured in a fire-box of given section, than where flat grates are used, the difference being nearly the same as between the semi-surface of a cylinder excluding the ends, and the area of its longitudinal section through its axis.

Fifth. It is claimed that coal-slack, refuse lumber, saw dust etc., are effectually and economically consumed in this grate.

Sixth. Clinkers and cinders are removed much easier than from flat grates.

We have not seen this grate in use, but we have been shown a large number of testimonials from practical men which fully substantiate all that is claimed for it. Its form is well calculated to secure durability, as the mass of metal in the grate is large in proportion to the fire surface.

Patented by D. Byard, Sept. 7, 1869. For rights, etc., address Byard, Neilor & Co., Sharon, Pa.

Oxidation of Iron in Buildings.

The London *Builder* thinks the question of the mode in which iron suffers from oxidation, when included in masonry, appears likely to attract fresh attention. It is a subject on which those persons who are familiar with the repairs, or even with the demolition of old buildings, are not altogether without experience. But especial value attaches to the discoveries made on the recent occasion of the examination and repair of the tomb of King Henry VII., in Westminster Abbey, from the fact that both the date of erection and the subsequent history of the monument, are so distinctly ascertained.

After the cleansing of the statue of the Countess of Richmond, to which so much public attention was directed in last May, the curators of the tombs proceeded to examine the central monument of the Abbey, that of King Henry VII. and his queen, standing, as is well known, in the chapel founded by that sovereign under the protection of a richly-wrought *grille*.

Not only did the effigies appear to be coated and partially corroded in consequence of long neglect, but the altar-tomb itself gave symptoms of dilapidation and decay. Joints yawned, and cracks menaced, and the general appearance was such as is often produced, in similar structures, by subsidence of the foundations. The effigies were therefore carefully removed and carried into the eastern apse, or smaller chapel, where they were cleaned, and that with great science. The altar-tomb itself was taken to pieces, with a view to its replacement in its original integrity. It soon appeared that no subsidence had occurred. On the contrary, the tomb had been built on the finished pavement of the chapel, and the portion of this pavement which had thus been protected from wear was in a condition of great and original splendor, being enriched with a diapered pattern, partly polished, and partly pounced or frosted.

The actual cause of the dilapidation of the tomb then appeared. It was nothing but the oxidation of the only pieces of iron which had been employed by the builders. All the fittings were of copper, with one exception. At each corner of the tomb sits a boy angel, in gilded copper. To keep these figures in their place copper bolts were employed, which

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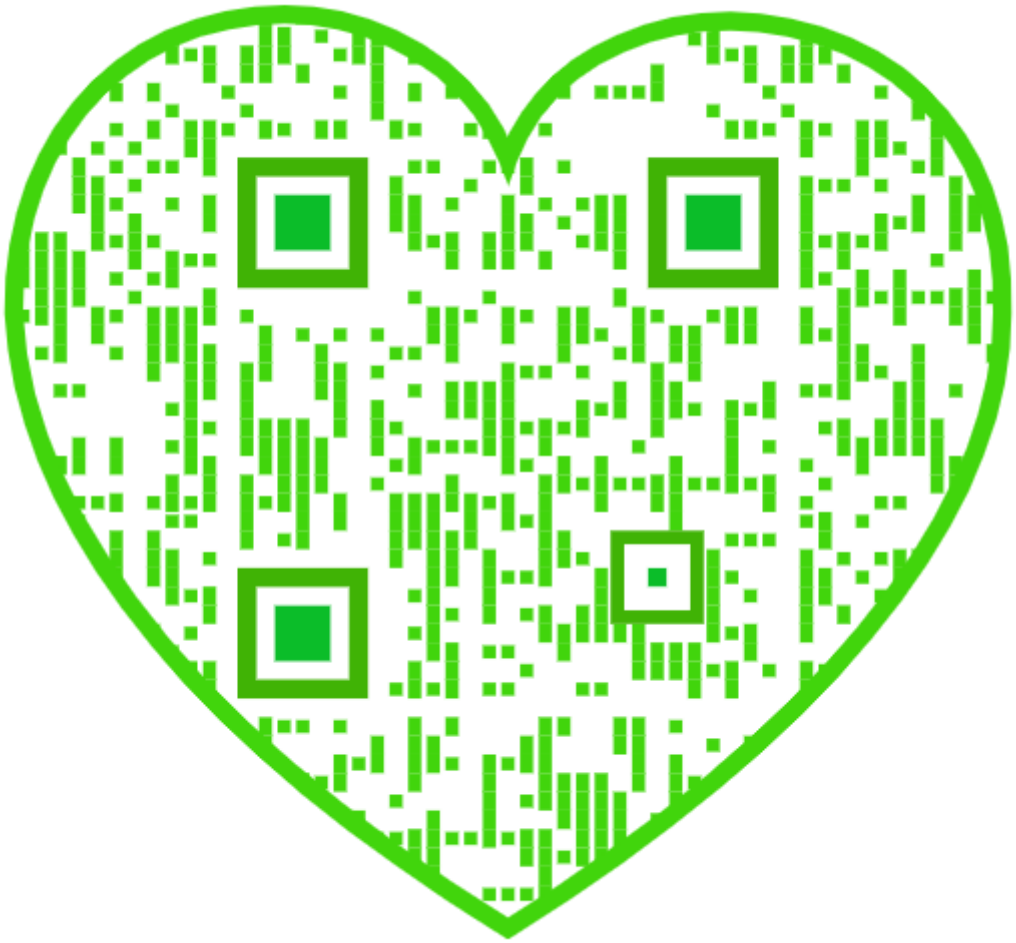


passed through the upper portion of the ornamental work, and were secured by attachment to four plates of iron, which were built into the tomb itself, under the slab on which the effigies rested. These four iron plates, notwithstanding their protection, first by the work of the tomb itself, and, secondly, by the building which sheltered the tomb from the chief vicissitudes of atmospheric temperature, had developed, on either side of each, solid plates of rust, of from three to four times the thickness of the original iron. The slow formation of this oxide had acted as an irresistible wedge, riving the fabric asunder, and threatening in course of time the entire overthrow of this noble monument.

Specimens of these plates of oxide, as well as one of the original iron plates, were exhibited at the meeting of the Royal Archæological Institute, on the 2d of July last. The dangerous metal has now been replaced by plates of copper; and the tomb has been restored to its original beauty, but the lesson as to the conduct of iron when included in masonry or in mortar, even under circumstances which might be presumed to be more than ordinarily favorable, is not one of which any prudent architect or engineer will lose sight.

METAL SPINNING.

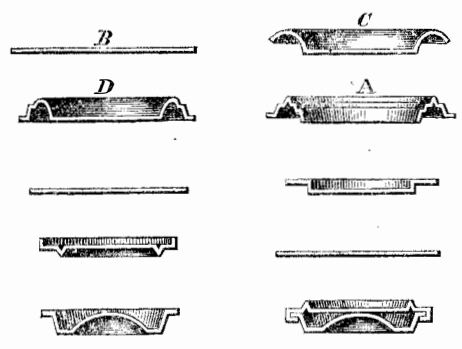
BY JOHN ANDERSON, C. E., IN THE CANTOR SERIES OF LECTURES BEFORE THE SOCIETY OF ARTS.

There is a system of operations for altering the shape of malleable metals, namely that of causing the sheet metal to conform or flow into hemispherical, oval, or irregular forms by motion, which was invented in France a few years ago, but which is now extensively adopted in England. The process is called "spinning," and is rapidly superseding the die-stamping method wherever it can be employed advantageously, because it acts more kindly on the metal. It is the result of gentle pressure combined with rapid motion, and involves a great principle; the effect is due to motion in connection with time. The chief feature in all such changing of form is the giving sufficient time for the particles to move or flow. To press the flow too rapidly would cause the sheet to tear from rupture of particles. In the operation of spinning, this tendency to tear is defeated by communicating a very rapid circular motion to the sheet of metal, and then by means of an instrument or instruments held in the hand, a gentle pressure is brought to bear on one point, thus causing a slight depression; but as the sheet is spinning at high velocity, the depression at once forms a circle, and so by continuing the pressure of the instrument it is molded into any form accordingly.

The operation of spinning is performed in a species of lathe. A mold of the required form is generally fixed on the end or face plate of the revolving spindle; the sheet or disk of metal is held by pressure from another headstock against the mold, and by the local pressure of the instrument is thus adroitly formed into the shape of the mold behind it.

On the table before us are specimens of the progressive manufacture of the lids of powder-cases, as they are made in the Royal Arsenal by this principle of operation, termed "spinning," by examining which its nature will be understood; it will also be seen how much change of form or rather movement among molecules, is requisite to produce the rigid or brittle condition that necessitates the annealing process, in order to restore the malleable and ductile property, which is required to still further change the shape. There is first the entire mouthpiece of the case in the form, here shown, in Fig. 1, ready to be attached to the flat surface of the case

FIG. 1.



top; the stationary part has reached its present peculiar shape A, through five stages. It is first cut into the flat disk, B, then the disk is spun, so far as C; it is now required to be annealed, and after this, it is turned into the third condition; it is then spun into the fourth stage, D, and from that to the finished article A. The lid which fits into A is composed of two separate pieces, both made by spinning from disks, and both pieces, when complete, are united by spinning over a lap of one upon the other. It will be observed that certain corrugations are produced by the process; these add greatly to the strength, but scarcely anything to the cost. It will also be seen how nicely the lid fits into the mouthpiece; this nice fit does not depend on the workmen, but wholly on the mold in the lathe, from which it is correctly transferred by copying, by the pressure of the spinning instrument.

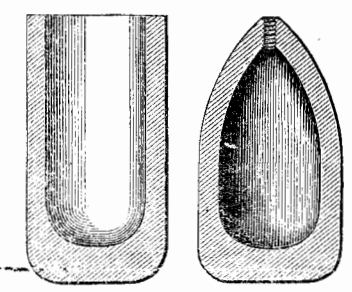
The French, who were the originators of the process, employ it with great dexterity in a variety of ways, more especially in the production of such articles as large oval dish-covers. The sheet is secured to the center of what may be called an oval chuck, and by a dexterous use of two pieces of greased box-wood held in both hands, the workman very cleverly prevents the sheet from puckering as he spins it into an oval, and finally turns over the outer edge into a border, thus giving it rigidity as well as a neat finish. The time required for the operation is so short as to be scarcely credible, and has to be seen to be appreciated.

The metal wrought-iron, as used by the smith, is also exceedingly malleable, both hot and cold, but especially when it is hot. All are familiar with this method in the condition called "tin plate," which is a thin sheet of iron spread out with rollers, afterwards cleaned, then covered with tin as a preservation from oxidation as well as for appearance, besides the facility which it affords for being united by solder in the hands of the tinman.

In the Great Exhibition of 1851, a foreign exhibitor had an iron book, in which the leaves were made of iron as thin as tissue paper; and iron may be seen of any substance or shape, every variety of bar, or, worthy of Vulcan, up to armor plates of 15 inches in thickness, or 25 feet long, 5 feet wide, and 8 inches thick, as made at the well-named "Cyclops" Works. Iron or steel may be drawn into gun barrels like dough over a mandrel, but one of the most marvelous illustrations of the malleable, ductile, and flowing properties of wrought-iron, is shown by the manufacture of quicksilver bottles. These bottles are made in various ways; in the process referred to, the bottle is made out of a circular disk of iron plate, which contains the quantity of iron necessary to form the article. By the stamping process already described, the disk of iron is gradually brought round to be of a cylinder shape, resembling the form of drinking glass called a tumbler. This cylinder is then put upon the end of a steel pin or mandrel, and by mechanical pressure, is pushed through a hole, which hole is smaller than its own dimension, thereby reducing its exterior diameter, but at the same time drawing or rather pushing the iron over the mandrel in the same manner as a piece of dough could be drawn over the finger to fit like a glove. This process is repeated through a succession of smaller and smaller holes, one after the other, until at length it becomes a long cylinder, close at one end but open at the other. The neck of the bottle has next to be formed on the same principle, by an often-repeated pressing and twisting at the open end into a conical die, by which means it is gradually and successfully brought to the form of the bottle neck, in which a screw is afterwards formed for the stopper by the ordinary means.

During the Crimean war, a large manufacture of wrought-iron shells was carried on in the Royal Arsenal, not precisely, but nearly in the same manner. They were made in an elongated form, and of an oval section, as shown on the diagram, Fig 2. These shells were made out of a single piece of iron, in which to form the cylinder, welding was so far employed, but were then brought to the bottle shape by what may be called hammers. The mouth of the shell was attacked simultaneously by a circle of hammers, whose united surfaces afforded the required shape, while the other parts of the machine prevented the shell from flinching during the operation, and thus it gradually came into the bottle shape without any puckering, which most men would previously have expected. Such a result was entirely due to the uniform effect of the combination of hammers, thus constituting a sort of die.

FIG. 2.



The elongation of a quicksilver bottle over a mandrel partly anticipates the nature of the ductile property, yet not entirely so. Ductility is that natural property by means of which a solid substance, such as iron, steel, and other metals, can be drawn or pulled out to almost any degree of fineness. This property, although often accompanying malleability, does not do so in some cases, such as in lead, possibly for want of tenacity, as lead can be squirted into any thread of any fineness by pressure. This natural property of ductility is taken advantage of to produce endless variety of form, but in all the mechanical principles employed are nearly alike—namely, to pull the metal through a rolling or stationary hole, and thus to alter its form or dimensions.

To take the simplest and most familiar case, that of common wire-making—the iron or other metal is first rolled out into a long bar of small diameter; the end of this bar is reduced in pointed fashion so as to enter a conical hole in a steel "draw-plate," as it is termed, the hole being smaller than the remainder of the bar; a pair of pincers worked by machinery seizes hold of the small end of the bar; the draw-plate is held rigidly; then the force applied is sufficient to overcome the unwillingness of the particles to move, but the flowing property permits the change, and the iron rod is thereby drawn out into a smaller and longer wire, which is repeated through smaller and smaller holes in succession, with occasional annealing, until at length the requisite fineness is arrived at. From this it will be seen that the shape of the wire depends on the form of the hole in the draw-plate, and may be to any pattern—sprigs of flowers for the calico printer, toothed-pinion steel wire for the watch and clock maker, or even tempered steel wire of all sizes for the pianoforte maker.

How Phosphorus is Made.

The earthy matter of bones consists of three equivalents of lime united with one equivalent of phosphoric acid. It is what chemists term "a tribasic phosphate of lime." Phosphoric acid consists of one equivalent of phosphorus united with five equivalents of oxygen. In order to obtain the phosphorus, it is only necessary to take away those five equivalents of oxygen, which we can do by mixing the compound with charcoal after some preliminary operations, and heating them together. The charcoal takes away the oxygen and forms carbonic oxide with it, while the phosphorus distils over. In this way we get phosphorus in the condition in which you are very familiar with it. It is a wax-like substance, which must be handled with care, because if you allow it to dry, the heat of the fingers would be sufficient to inflame it.

Now observe what this substance looks like. It is semi-transparent; it is soft; you can cut it like wax. It is exceedingly poisonous, and in the making of lucifer matches it is found to be a very insidious poison. Lucifer match makers are apt at first to be subject to an affection which does not draw much attention. They complain frequently of tooth-ache, but they do not know the insidious disease which is creeping upon them. The lucifer match makers who make lucifer matches from this phosphorus, are subject to the most distressing of all diseases; the jawbone becomes destroyed, and frequently disappears or becomes useless, and some of them spend the greater part of their lives in the wards of hospitals. It therefore became an important point for science to find some way by which this phosphorus should be deprived of its poisonous properties without losing those chemical characteristics which make it so useful in making matches for instantaneous light.

Prof. Schrotter, of Austria, met this want of science in a very skillful way, as follows: By taking common phosphorus and exposing it for some time to a temperature of 47°, this yellow, waxy, transparent substance transforms into a dark, brick-like substance. It is no longer so inflammable as to ignite spontaneously. It may be packed up in boxes without danger of spontaneous combustion; but what is more important, it has lost all its poisonous properties. The phosphorus, which was poisonous before, is no longer poisonous in this condition, and it is still capable of being used for making lucifer matches.

Raising of an Old War Ship.

In October 1779, says the Philadelphia *Age*, a British fleet, consisting of the *Roebuck*, 44 guns; *Meslin*, 18 guns, and a galley of 3 guns, commenced from the mouth of the Delaware a gradual approach to our city, which they proposed bombarding. To prevent this movement, the colonists had the famous little *Wasp* and the *Lexington*, with a few tenders; but they could only harass these vessels. But to prevent their upward progress, the Americans, as a further defense, constructed a fort on the lower end of Hog Island, and between that and the fort on the Jersey shore just opposite they sunk a number of hulks, thus preventing the passage up the river of any heavy vessel. On the 20th of October, 1779, the British vessels named attacked these forts, but a fleet of fire rafts drove them down the river.

On the 22d of the same month the new frigate *Augusta*, direct from England, reinforced the British force. She was one of the old-fashioned, cumbersome double-deckers, with high sides, bristling with guns. She was loaded with ammunition, shot, and a surplus armament for light ships, which the British hoped to construct on this side of the Atlantic.

The fleet, thus increased, re-attacked the fort on the Jersey shore, above Woodbury Creek, being cooperated with by 2,000 Hessians on shore, under command of General Danupe. The commander of the American galley *Chatham*, had twelve smaller galleys lying just below our city, and hearing of the approach of the British, dropped down stream, and on the afternoon of the 24th, opened the engagement with the four British frigates. This engagement lasted into the night, during which the *Augusta* grounded, and her consorts fled down the river. The *Augusta* was on the next morning discovered, attacked, and set on fire. Of the 300 men she had on board, just one half were drowned, by leaping ashore or being carried down by the frigate when she sunk. Here, in this mud bank, lying near the Jersey shore, opposite Hog Island, she has been embedded—the deposits accumulating, until the hull sat in the mire to the depth of fourteen feet.

About two weeks ago, James Powell, Jos. Moore, Geo. Murphy, Gabriel Sheppard, and Chas. Meyers, conceived the idea of raising the wreck and reaping pay for their labors by selling whatever it might contain. Submarine workers were employed; chains were passed beneath the old frame, and attached to canal boats on either side. The latter were partially filled with water, the cables passing under the hull of the wreck were tightened, and the water pumped out of the boats. The latter becoming buoyant rose up, and with them the remains of the *Augusta*, which finally were towed to Gloucester. Here, within the past few days, three of the old-fashioned guns were taken from her; a number of skulls, remnants of the ill-fated British; sixty tuns of shot, used in the small smooth bore cannon of the time; a great quantity of Kentledge ballast, consisting of blocks of cast iron, and a large number of relics, which will be highly prized. Among these were a silver spear, marked "H. W., 1748," a fat old bull's eye watch, with its works eaten up by rust, a number of guineas with a raised profile of George III., and some silver coin dated 1760. The frame of the *Augusta* is of Irish oak, and the wood is sound and proof against decomposition.

Curious Phenomenon in Artillery Firing.

A phenomenon connected with the fire of rifled artillery has lately been illustrated afresh by the experiments of the British Indian Equipment Committee. It is popularly believed that the projectiles from a rifled gun will have left the muzzle before any sensible recoil can take place; this is an error which was detected as follows: It had frequently been noticed that when rifled guns were fired point blank, or with the axis of the bore truly horizontal, the shot appeared to rise after it had left the muzzle, and the range was much greater than the theory would lead us to expect. This was

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at first ridiculed; the idea of a shot rising was preposterous and contrary to the first principles of dynamics. One might as well expect Newton's apple to rise in the air instead of tumbling to the ground. Facts, however, are stubborn, and it was asserted that, although theoretically it should not, practically the shot did rise. The first careful experiments in this direction made in this country were carried out by the late Ordnance Select Committee in 1864. The 12-pounder breech-loader rifled gun of eight cwt. was fired with an elongated shot of 11½ lbs., and a charge of ½lb., at an upright wooden target of forty yards. The gun was laid with the axis of the bore truly horizontal, that is, parallel with the ground, and the exact level of the center of the muzzle was taken on the target by a theodolite. Theoretically, the shot would fall by gravity in passing over the forty yards, and its center should have struck about two inches below the level; practically, however, it was found to strike ten inches above it! This fact once established beyond all doubt, many theorists set about accounting for it; their speculations, however, cannot here be recapitulated. The probable explanation is that the recoil is sensibly felt before the shot has left the gun, and that the resultant of the forces acting on the gun and carriage tends to throw the muzzle up—thus the projectile, although seemingly fired point blank, really leaves the gun at an angle. With the 12-pounder breech-loading gun this angle was found to equal about thirty minutes, while with the 9-pounder muzzle-loading Indian gun it equals only about thirteen minutes. The difference is probably due to the projectile taking a longer time to pass through the bore of the breech-loading gun. It may be mentioned that when the gun is swung as a pendulum and fired with its axis horizontal the shot strikes below the level.—*London Globe.*

Well Boring and Pumping Machinery.

An interesting paper on the above subject was recently read before the Institution of Mechanical Engineers, at Birmingham, England, by William Mather. In the operation of excavating boreholes for wells and other purposes, the principle adopted and carried out by the writer for all depths of boring has been the use of a rope for working the boring tool in the hole; and this principle obviates the serious expense and delay attending the plan of using rods for working the tool, when great depths of boring have to be executed. In the plan described in the paper, the boring tool is worked by a flat hemp rope, which is wound around the drum of a winding engine, and on quitting the drum passes over a large pulley carried in a fork at the top of the piston-rod of a vertical single-acting steam cylinder. The boring tool having been lowered by the winding drum to the bottom of the borehole, the rope is clamped secure at that length; steam is then admitted underneath the piston of the vertical cylinder, and the tool is lifted by the ascent of the piston-rod and pulley; and on arriving at the top of the stroke the exhaust valve is opened for the steam to escape, allowing the piston-rod and carrying pulley to fall freely with the boring tool, which falls with its full weight to the bottom of the borehole. A cushion of steam prevents the piston from striking the bottom of the cylinder, and the steam and exhaust valves are worked by tappets on a plug-rod; a rapid succession of blows is thus given by the boring tool on the bottom of the borehole. The boring tool is composed of a number of chisels or cutters, fixed in the cast-iron head at the bottom of the long wrough-iron boring bar, which is guided vertically in the borehole by a couple of collars; and it is made to rotate a little between each blow, so as to strike in a fresh place each time, by means of a simple self-acting arrangement. The lifting shackle at the top of the boring bar is allowed to slide up and down through a short distance on the neck of the boring bar between two fixed collars; the upper face of the lower collar is formed with ratchet-teeth, and the under face of the top collar is formed with similar ratchet-teeth, but set half a turn in advance of the teeth on the lower collar. The intervening boss of the lifting shackle is also formed with corresponding ratchet-teeth on both its upper and lower faces, these teeth being in a line with one another. When the boring tool falls and strikes the blow, the lifting shackle, which during the lifting has been engaged with the rachet-teeth of the top collar, falls upon those of the bottom collar, and thereby receives a twist backwards through the space of half a tooth; and on commencing to lift again, the shackle rising up against the rachet-teeth of the top collar receives a further twist backwards through half a tooth. The flat rope is thus twisted backwards to the extent of one tooth of the ratchet, and during the lifting of the tool it untwists itself again, thereby rotating the boring tool forwards through that extent of twist between each successive blow of the tool; and this turning is found to be quite certain and continuous in action during the working of the tool. When a sufficient quantity of material has been broken up at the bottom of the borehole by the blows of the tool, the working of the percussion cylinder and pulley is stopped, the rope unclamped, and the boring tool wound up with great rapidity by the winding drum. A shell-pump is then lowered down the borehole by the rope, consisting of a long cylindrical shell or barrel, with a clack valve at the bottom opening inwards, and a bucket, containing flap valves opening upwards. The rope is attached to the bucket, and when the pump reaches the bottom, the bucket is worked up and down by the rope several times, so as to draw in the broken material through the bottom clack; after which the pump is drawn up again with the material contained in it, and the boring tool again lowered into the hole for continuing the boring. In the event of accidents from breakages or from any of the implements sticking fast in the borehole in rising, grappling tools with hooked claws of suitable shape are employed for laying hold of the obstacle and raising it; or if it cannot be brought up by this means, a solid wrought iron breaking bar, of very great weight is lowered into the hole, and allowed to fall upon the obstacle from a sufficient hight to break it up into fragments, which are then raised either by grappling tools or by the shell pump.

Ransome's Induration Process.

We learn from *Engineering* that Mr. Ransome's method of waterproofing walls by means of successive solutions of silicate of soda and chloride of calcium, which has been applied with so much success to many public and private buildings in England, is being used extensively in India to arrest the decay of many brick structures upon railways in that country. Among others it mentions the Waree Bunder Works, upon the Great Indian Peninsula Railway, which were constructed of such inferior material that a rapid deterioration speedily followed the construction of the works, and the crumbling of the bricks left no alternative apparent save that of rebuilding. It was, however, determined to experiment with Mr. Ransome's process, and accordingly, in 1868, it was extensively applied to the failing buildings, with the result of effectually stopping the decay, and of placing so fine and hard a surface upon the bricks that the material, which before could be crumbled by the touch, received a surface so hard as to resist the scratching from a steel point. In this manner extensive workshops and a chimney shaft were, at an insignificant outlay, rescued from destruction, and rendered sound and durable.

Heating Surface of Boilers.

The quantity of steam generally produced on every 39 inches square of surface or cylinder boilers, is from 44 to 66 pounds per hour. In marine boilers it averages about 77 pounds per hour.

For high-pressure engines, the heating surface is generally calculated, per horse power, as follows: Small boilers, 85 inches; medium size, 55 inches; large size, 40 inches, and even less.

For low-pressure engines, per horse power, as follows: Small boilers, 60 inches; medium sized, 40 inches; large size, 39 inches, and even less.

Recent comparative experiments have shown that 42 feet of boiler surface made 22 pounds of steam from 35·2 pounds of coal; 52·5 feet surface made 220 pounds of steam from 30·75 pounds of coal; 63 feet surface made 220 pounds of steam from 29 pounds of coal; 84 feet surface made 220 pounds of steam from 27·55 pounds of coal; 105 feet surface made 220 pounds of steam from 27·21 pounds of coal.—*Deby's Steam Vade Mecum.*

Preservation of Eggs.

The *Journal de Pharmacie et de Chimie* contains an account of some experiments by M. H. Viollette, on the best method of preserving eggs, a subject of much importance to France. Many methods had been tried: continued immersion in lime-water or salt water; exclusion of air by water, sawdust, etc., and even varnishing had been tried, but respectively condemned. The simplicity of the method adopted in many farms—namely, that of closing the pores of the shell with grease or oil had, however, attracted the attention of the author, who draws the following conclusions from a series of experiments on this method: Vegetable oils, more especially linseed, simply rubbed on to the egg hinders any alteration for a sufficiently extensive period, and presents a very simple and efficacious method of preservation, eclipsing any methods hitherto recommended or practiced.

Watch Repairers' Shop.

A correspondent in the *Horological Journal* makes the following practical suggestions:

"How vexatious to drop a small article and spend a quarter of an hour of valuable time in fruitless search for it—getting on your knees, dirtying your pants, growing red in the face, partly from your inverted position, and partly from anger. All this may be easily avoided. Thus:

"First, sweep very clean every nook, and corner, and crack about your bench and window, then get a pound or two of putty (no matter 'what's the price of putty'), and a few strips of nice soft pine, then putty up every crevice that is large enough to conceal a jewel screw; the large cracks stop partially with bits of pine and finish with putty; don't miss a single place. The whole job won't take you longer than you will be searching for a lost second-hand, and then when anything does drop, you can find it in a moment by sweeping your floor with a little broom brush."

Our Impending Doom.

A public lecturer in this city recently argued that religion was useless because "man's existence on the earth is momentary. Science teaches us that in 6,300 years more a grand deluge will end his race and make him a fossil. You may think this an idle tale, but it is not. Astronomy shows that the earth is oscillating in the angle of its axis to the sun in periods of 21 000 years. The zones are undergoing a constant change. Now, at the North Pole it is growing colder each year, and at the South Pole warmer. Thus, an immense accumulation of glaciers or icebergs at the North Pole will result, while at the South they will not form at all. In 6,300 years the glaciers will have accumulated so much that they will suddenly over-balance the earth. Then the waters of the sea will rush from the south to the north, and there will be a deluge." Stand from under!

THE yearly mortality of the globe is 33,333,333 persons. This is at the rate of 91,554 per day, 3,830 per hour, 62 per minute.

H. W. STAPLES' AUTOMATIC LAMP-FILLER.

In our description of this invention, published on page 344, current volume (issue of Nov. 27, 1869), an important point claimed by the inventor was omitted. If the reader will again refer to the engraving he will see that the vent tube, which also acts as a brace bewteen the nozzle and breast of the can, terminates at the letter A, which represents an opening in the side of the nozzle, through which air enters while the oil is flowing out of the nozzle. As soon, however, as the oil rises in the lamp as high as the vent hole, A, it covers this hole, and the flow of oil from the filler is checked. The fluid as it flows over the end of the vent tube, produces an audible whistling sound, which ceases when the vent hole is stopped by the rising of the fluid in the lamp, as the flow then ceases.

Thus a metal lamp or one made of any opaque material, as well as one of transparent glass, can be filled without danger of its running over, the filler stopping automatically when the lamp is filled to the proper hight. The advantage of controlling the flow is gained by the simplest means, and all danger of overflow prevented.

Editorial Summary.

FROST CRYSTALS UPON DRIED GRASS.—Several persons have by this time laid up to put into bouquets the beautiful grasses which they gathered in the autumn and summer of the present year. In order to add variety and some pleasing effects to portions of such grasses, they may be covered with imitation frost-crystals, some white, others blue-green, and amber. To crystallize dry grass white, steep it in a solution of one pint of hot water containing one pound of alum. As it becomes cold, crystals will adhere to the grass, which will increase in size if left for a day or more; but small crystals look the best; and in order to keep them so, the grass should be often moved and turned about. When taken out of the solution and dried in the air, they are fit for mounting with the other grasses, and greatly add to their beauty. For the blue-green crystals use sulphate of copper, and for amber crystals use chromate of potash instead of the alum. Feathers may also be crystallized in the same way. Art and taste will arrange them into forms of beauty.—*Septimus Piesse.*

A NEW THING IN POSTAGE.—The Austrian Government has introduced a novelty in postage, which might be introduced with great benefit in all countries. The object is to enable persons to send off, with the least possible trouble, messages of small importance, without the trouble of obtaining paper, pens, and envelopes. Cards of a fixed size are sold at all the post offices for two kreutzers, one side being for the address and the other for the note, which may be written either with ink or with any kind of pencil. It is thrown into the box, and delivered without envelopes. A halfpenny post of this kind would certainly be very convenient, especially in large towns, and a man of business, carrying a few such cards in his pocketbook, would find them very useful. There is an additional advantage attaching to the card, namely, that of having the address and postmark inseparably fixed to the note.

TO CURE THE RANK SMELL OF HORSE STABLES.—Sawdust, wetted with sulphuric acid, diluted with forty parts of water and distributed about horse stables will, it is said, remove the disagreeable ammoniacal smell, the sulphuric acid combining with the ammonia to form a salt. Chloride of lime slowly evolves chlorine which will do the same thing, but then the chlorine smells worse than the ammonia. Sulphuric acid on the contrary is perfectly inodorous. The mixture should be kept in shallow earthenware vessels. The sulphuric acid used alone, either diluted or strong, would absorb more or less of the ammonia, but there would be danger of spiling it about and causing serious damages, and besides this the sawdust offers a large surface to the floating gas. The experiment is easily tried, and it may prove successful.

THE Boston *Advertiser* reports that a curious phenomenon is frequently taking place at Machiasport, Maine, in the harbor opposite the wharves. It is an upheaval, by some power altogether unknown, of vast quantities of water, mud, and stones, to the distance of many feet, and with a furious rushing noise. This phenomenon has occurred quite a number of times during the summer, and once as late as a month ago.

PATENT CLAIMS.—Persons desiring the weekly official list of patent claims, are referred to a notice concerning the supplying of them in our advertising columns. The Commissioner of Patents would deem it a special favor if parties who intend to subscribe would order immediately, so that he may know how large an edition to publish.

A CORRESPONDENT of the *Mechanics' Magazine* states that the Moncrieff system of mounting artillery, which has lately attracted so much attention abroad, was anticipated 1811, by a French officer, who published a system of mounting guns not essentially different from that of Capt. Moncrieff.

BLACK PAINT FOR IRONWORK.—A varnish for ironwork can be made as follows: Obtain some good clean gas tar, and boil for four or five hours, until it runs as fine as water; then add one quart of turpentine to a gallon of tar, and boil another half hour. Apply hot.

THE following is a German recipe for coating wood with a substance as hard as stone: 40 parts of chalk, 50 of resin, and 4 of linseed oil, melted together; to this should be added one part of oxide of copper, and afterwards one part of sulphuric acid. This last ingredient must be added carefully. The mixture, while hot, is applied with a brush.

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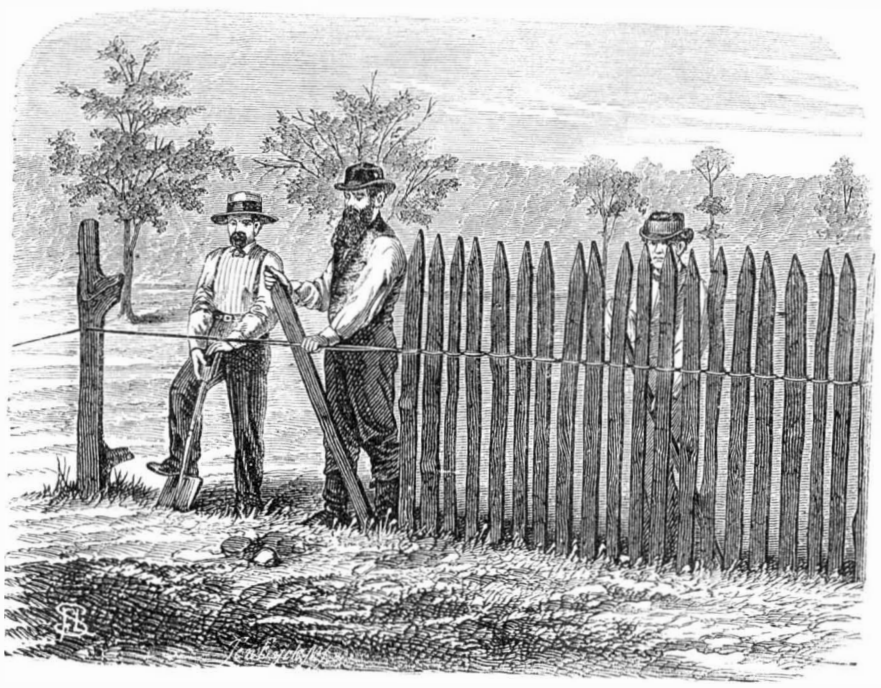
Wire and Picket Fence.

The use of wire as a substitute for bars between posts of fences, has gone the way of plank roads. It was "weighed in the balance and found wanting." The reasons for this termination to the experiment are too well known to need discussion here. The invention shown in the annexed engraving, employs wire only as a connector between upright pickets in lieu of the rails between posts, to which pickets are ordinarily nailed, and also reduces the number of posts required as will be seen in its description below.

It is intended to furnish a cheap, neat, and durable fence, that can be rapidly constructed, and dispenses with the use of nails.

The saving in posts is claimed to be sufficient to pay for the wire, as the posts are set from twenty to thirty feet apart.

Two wires are drawn through a hole in the first post set, and through similar holes in the other posts, to any convenient distance. The wires being fastened at the first or starting post, are left slack along the line for the insertion of the pickets, and wound around the last post of the section of fence under construction to keep them from being drawn back during the insertion of the pickets. The wires are then tightened by laying weights on the slack between posts, the palings distributed along the line answering perfectly for this purpose, one end being allowed to rest upon the ground and the other lying upon the slack wire, and as many being used in a bunch as may tighten the wire sufficiently.



P. DAVIS' IMPROVED PATENT FENCE.

The slack being thus taken up, the butts of the palings are successively set in a shallow trench dug between the posts on the fence line, and the tops being inclined laterally, until they will enter between the wires from the under side, they are brought to the vertical position, the wires being crossed between each picket, care being taken to keep the same wire always at the top.

The wires may be tightened if they should ever become slack by simply putting a twist in them, using a pair of palings for this purpose, turning them in opposite directions.

As fast as the palings are inserted, their butts are held by filling in and packing the earth in the trench.

This fence is impassable to all kinds of domestic animals, as nothing but a rat or similar burrowing animal can get under it, and a squirrel is about the only living thing which would attempt to climb over it. No domestic animal could crowd the pickets apart to get through it. The palings can not be pulled off, nor can the wind blow it down. The pickets take the strain off the posts, each one being, in fact, itself a post. The corner posts only require to be of greater strength than the other posts. Each post saves a paling, and may be made to look like it. The sides of the fence are uniform in appearance.

The fence represented in our engraving is a rude farm fence made with split palings; but with sawed palings of equal widths, it can be made very tasteful in appearance, and any form of either wood or metal palings may be used, to suit the taste of the builder. The inventor states that three hands can easily put up six hundred yards of this fence per day. He estimates the actual expense of a complete farm fence with top-sharpened split palings, with butts coated with tar or petroleum, as less than fifty cents per rod.

The palings need only be set from four to eight inches in the ground, according to the character of the soil. When stones are plenty they can take the place of a trench, in which case the butts of the palings do not need any protective coating.

Whether this invention was called forth by our article on cheap fences, published on page 9, current volume, or not, we are unable to say, but it meets a want therein set forth. At any rate, men of inventive genius will find in that and the numerous similar articles we publish, hints that will guide them to important and profitable inventions.

This fence was patented through the Scientific American Patent Agency, June 29, 1869, by P. Davis, of Newport News, Va., whom address for further information.

Paper Hangings.

When an amateur attempts this kind of domestic decoration it is desirable that he should attend to the following instructions, otherwise the work, when finished, will show blemishes and stains. First, pumice-stone the wall to remove all irregularities of surface, then wash over the size, about one ounce of glue to a gallon of water, and when dry, the wall is ready to ready to receive the paper. The paste should be well boiled and then passed through a hair sieve to extract the lumps, a fruitful source of stains. If the walls are inclined to show damp, add a little corrosive sublimate to the paste to prevent mildew forming on the surface of the paper The most important matter is to allow the paper to remain pasted for about ten minutes before hanging, in order that it may be well stretched before being placed on the wall. Stout paper hangings such as the "flocks," etc., require a longer time. If these directions are attended to the thinnest papers will hang without a crease or the objectionable water stains which characterize bad workmanship.

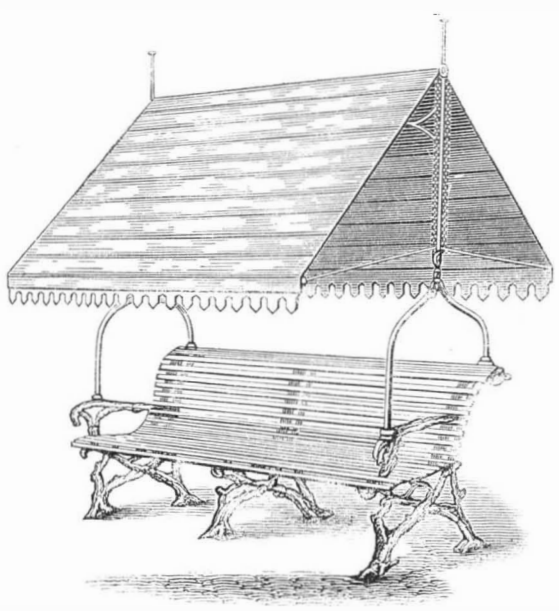
Gluing in Veneers.

I have advised the use of waterproof cements for fine inlaying, so that dampness will not affect them, but as this is not always convenient, it is well to make the glue so that it can be used and the work finished off in a short time. This is easily done by making the glue as thick as it will run, or so that it is like a jelly. If applied in this condition, it will set hard in thirty minutes, and the work may be cut down without fear or danger of its moving. I have done this frequently, in order to see what kind of work I was making. Always put a clamp on your work wherever you can, for although the glue will adhere of itself to the wood, it adheres much more strongly if pressed down by a clamp. Also, never put a veneer on a piece of work that is uneven, for although it map set square under the pressure of the clamp, when you come to scrape it, it will give way and yield to the inequalities, and when varnished and polished, will be full of depressions.

Don't be afraid to rub down with sand paper, under the impression that you are spoiling the work, but let the varnish get thoroughly dried, and be hard before you attempt it. Be sure, also, to remove every particle of varnish if you touch it at all, otherwise that which remains will take a coat while the bare wood will not take so much, and you will have a surface full of scars and ridges. It is not necessary to touch the wood in rubbing down, but go down to the wood, so that a waxy appearance is presented, and you will have a handsome finish that will add greatly to the beauty of the work. White holly is easily soiled when used in connection with ebony, by the dust from it, and it will be necessary to rub it, or scrape it delicately, before varnishing, without touching the ebony.—*Watson's Manual of the Hand Lathe.*

TENT ROOF GARDEN CHAIR.

It must be confessed our English cousins are men of taste in all that pertains to personal comfort. The dainty garden chair we illustrate herewith must indeed be a comfortable



thing in which to recline and enjoy a fragrant Havana, after dinner. The roof is composed of a roller and two canvas shades, which are wound up or extended at will by means of a brass endless chain. Our readers will agree with us that this chair is a very enticing piece of garden or farm furniture, and as it can be imitated easily we shall expect next summer to see many of our suburban gardens adopting the luxury. An article executed tastefully like the one illustrated, will sell, and we hope some of our manufacturers will get them up ready for the next season. A few such tent chairs in a garden would obviate the necessity for a summer-house.

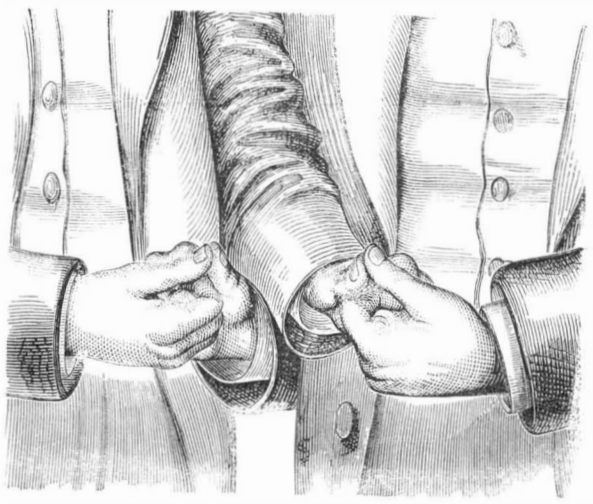
COMMUNICATION WITH AND BETWEEN DEAF MUTES

The sign language, used as a means of communication between deaf mutes, is of course unavailable in the dark, and is also unadapted to the use of blind mutes. It is, moreover unadapted for private communications, as the language spoken to one is spoken to all present who understand it. Spoken language can be whispered, or its volume can be so reduced as to be inaudible to other ears than those for which it is intended; but the force of the sign language cannot thus be modified, and when private conversations are held, written language is generally employed. Besides the tediousness of this process, it cannot always be resorted to, and therefore inventors have tried to devise means whereby conversations may be carried on under all circumstances except the fatal and insurmountable one of separation.

We have within a year or two read in some foreign journal, the name of which we cannot at present remember, of an instrument employed for effecting communication between deaf mutes, or between them and those not versed in the sign language.

We have before us a slip which describes this instrument, and which states that the invention was made by Mr. Bertram Mitford, of Cheltenham, England. "He uses a hollow case of any convenient form or size, made of wood or other suitable light material, and this case is provided with a handle by which it is to be held in the hand of the person using it. On the side of the case which faces the user there are contained the letters of the alphabet, numerals, or other signs useful to persons holding conversation with one another; and upon the opposite side, which faces the person communicated with, there is provided an opening protected by glass. In the interior of the hollow case are placed a number of slides worked by buttons which traverse along slots arranged each immediately above a different letter or sign. The upper end of each of these slides carries the corresponding letter or sign to that marked on the case opposite to the particular button; and when any slide or button is pushed along the slot, the corresponding letter or sign will be presented at the glazed aperture on the opposite side of the case. By successively raising and lowering or moving the slides it is obvious that words can be easily spelt and communication be established with the deaf and dumb without necessitating the knowledge of the signs known as the deaf and dumb alphabet."

While it is evident that this machine will answer the purpose designed; it does not, of course, supply the want we have stated. Sight is absolutely necessary to its employment. We have only noticed it as illustrating the fact that some simple, and easily-formed alphabet is absolutely essential, and



this alphabet must be capable of being read and communicated by the sense of touch.

Such an alphabet, which, so far as we know, is new, it is our present object to lay before our readers. It is the invention of a gentleman living in Brooklyn, and he permits us to make it public property.

In reading or communicating this alphabet the hands are placed, as shown in the accompanying engraving, to bring like fingers of the hands together. The hands are nearly closed as shown, and the balls of the five fingers are placed together, as indicated. The fingers of each hand may be numbered from the thumb, the thumb being called 1 and the little finger 5.

The letters are made by a quick strong pressure of the balls of the fingers of the individual communicating upon the balls of the fingers of the person addressed, the hands of the latter remaining passive; the letters being indicated according to the following system. The touches will be indicated by dots, the number of touches by the number of dots, the fingers with which the touches are made by its number; those on the right hand being further indicated by the letter R and those on the left being indicated by the letter L. Thus:

A - 1, L.	N - 5, R.
B - - 4, L.	O - 4, R.
C - - 1, R.	P - - 5, R.
D - - 2, R.	Q - 4, 5, L.
E - 1, R.	R - 2, L.
F - - 1, L.	S - 3, L.
G - - 3, L.	T - 2, R.
H - 4, L.	U - 5, L.
I - 3, R.	V - 4, 5, R.
J - - 5, L.	W - - 2, L,
K - 2, 3, R.	X - 2, 3, 4, R.
L - 3, R.	Y - 2, 3, L
M - - 4, R.	Z - 2, 3, 4, L.

The word "Brute" would be, spelled out, - - 4, L; - 2, L, 5, L, ; 2, R; - 1, R; only six motions, which can be made

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in the time required for making the ordinary capital B with the pen. The number of motions required for spelling out word "Indestructibility" would require only twenty one motions, and it contains seventeen letters.

A system that could be more easily memorized might be devised, but it could not be executed so rapidly. With the alphabet we have given, it would be possible, after a little practice, to converse at the rate of one hundred words per minute, and as the motions are concealed by the position of the hands, eavesdroppers, if we may employ that term, would be counted out.

When a double letter is required, it is distinguished from other letters for which it might be mistaken by the touches being repeated more slowly. Thus, E, which is made by a single pressure of the first finger of the right hand will, when doubled, resemble C, which is made by two pressures of the same finger, unless the pressures are made full and slow.

Numbers may be spelled out, therefore no provision is made for them.

A slight twist of the wrist indicates the close of a word, and a brief hand-shake announces the close of a communication; pauses are not indicated, but ready made, as in speaking.

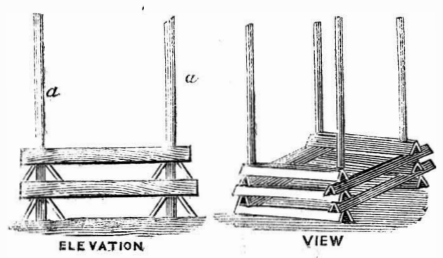
The position shown in the engraving is that adopted while persons are standing side by side, as in walking. In conversations, when persons are seated, the persons face each other, and the wrists cross; and in the reclining position, when persons face each other, conversation is practicable and easy.

The physical effort necessary to converse by this method is not nearly so great as in the ordinary sign language, a great advantage to sick mutes, who frequently are unable through failing strength to make their wants known.

We think our readers will agree with us that this is a very simple and ingenious method, and worthy the attention of those who are engaged in the care and instruction of deaf and blind mutes.

SEASONING BOARDS.

A correspondent of the *Building News* recommends the piling of floor boards as illustrated in the accompanying diagram. Four long poles are planted in the ground, and the boards are placed at an angle against them as shown. By



planting posts at short intervals between the corners many more boards can be stacked in the same space. This method gives a much freer circulation of air than the ordinary method, and consequently the drying proceeds with greater rapidity.

Sound and Electric Figures.

What are termed sound figures may be produced in various ways. One way is to fix a plate of glass at its center with Burgundy pitch to an upright support on a stand, then to dust the plate with fine dry sand or other suitable powder, such as lycopodium. If now the plate be made to vibrate by drawing over its edge a violin bow, or some horse-hair tightly stretched from the two ends of a cane well rosined, the dust will in due time arrange itself into certain forms, lines, or figures. The same will occur by tying over a broad-mouthed glass or goblet with bladder that has been moistened and allowed to dry to a drum-like surface, and dusted with lycopodium or very fine sand, and then put upon a piano. Certain lines are soon visible after the instrument has been played upon, particularly when one chord only has been struck, so as to lessen the vibration. The blowing of a cornet, using one key, or the tuning of one note of any instrument, near the stretched membrane, will cause it to vibrate, and the dust to arrange itself into form. Thus these experiments clearly exhibit the effects of sound; and by due study of the dust lines we may see what sound, one long passed, has been. A somewhat similar application of this experiment has recently been made by a German philosopher to the study of the nature of electrical discharges between metallic conductors. It is found that when an electric discharge takes place between a horizontal plate of metal powdered with lycopodium, forming the positive pole, and a ball or point placed below it, the dust remains attached to the plate on a well-determined area.—*Septimus Piesse.*

Good Cider Vinegar.

Take ten gallons of apple juice fresh from the press, and suffer it to ferment fully, which may be in about two weeks, or sooner if the weather is warm; and then add eight gallons like juice, new, for producing a second fermentation; in two weeks more add another like new quantity, for producing a third fermentation. This third fermentation is material. Now stop the bunghole with an empty bottle, with the neck downward, and expose it to the sun for some time. When the vinegar is come, draw off one half into a vinegar cask, and set it in a cool place above ground, for use when clear. With the other half in the first cask, proceed to make more vinegar in the same way. Thus one cask is to make in, the other to use from. When making the vinegar, let there be a moderate degree of heat, and free access of external air.

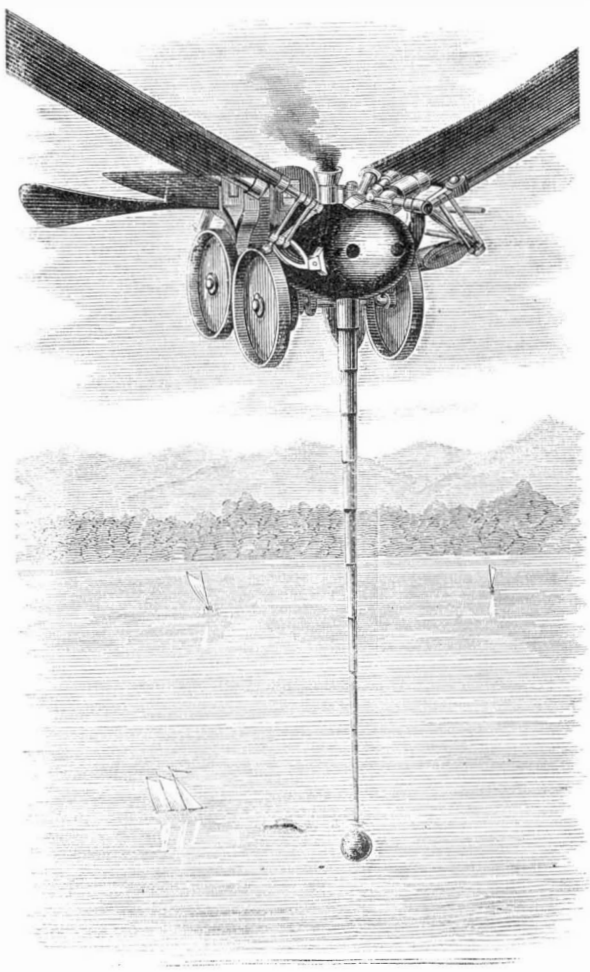
AERIAL NAVIGATION.

NUMBER FIVE.

We give herewith an account of an aerial steam machine designed by Joseph M. Kaufmann, a Glasgow engineer, an account of which we condense from *Engineering* of March 6, 1868. Only about two ninths of the wings, which are long and narrow, are represented in our engraving. From this remark the reader will understand they were of great length, and we may add that they were pointed somewhat like the wing of a swallow.

The actual machine, which the model was constructed to represent, was designed to be of the following dimensions:

From stem to stern, 12 feet; from stem to tip of tail, 14 feet 11 inches; greatest depth, 4 feet 6 inches; greatest width, 5 feet 1 inch; length of each wing, 35 feet; area of each wing, 221 square feet; length over the "gies," 17 feet 3 inches; Length of pendule, 40 feet; weight at end of pendule, 85 lbs.; total weight of machine, 7,000 lbs.; nominal power, 40-H. P.; intended speed, 40 miles per hour, the tank or tender taking a supply of oil and water sufficient for five hours.



As will be inferred from the engraving, it is intended that progress should be gained by flapping the wings, these wings being driven in such a manner that their motion resembles that of the wings of a bird as closely as possible. It is intended that when the machine is rising, the wings should make 120 strokes per minute. The pendule, which can be raised and lowered as desired, is for the purpose of keeping the machine in a horizontal position. The machine represented is exclusively for flying over land, and it is furnished with wheels on which it can run when on the ground; Mr. Kaufmann states, however, that by a few simple alterations it can be made available for traveling over water, and in case of its alighting be converted into a boat furnished with paddle wheels.

The model, to which we have already referred, weighed, complete, 42 lbs.; and during the experiments with it, its boiler, owing to its small size, was not fired, steam being supplied from an independent boiler. The model was made entirely to prove the correctness of the inventor's theory, and to ascertain if the connections to the wings could be made strong enough to withstand the violent twisting and bending strains to which they are exposed. In the model the motive power consists of a single vertical steam cylinder fitted with a piston in the usual way, the piston rod carrying a cross-head which is coupled by links directly to the wing beams. The wing beams are fitted to shafts which run for about three fourths the length of the machine. To these shafts are also connected the "regulators" by which the feathering motion of the wings is governed. Each wing is secured in four places, and has its center of oscillation directly opposite its working beam. The "gies" can be moved alternately so as to steer the machine either to the right or left without disturbing its horizontal position.

During the trial the model was securely fastened down and loaded with a considerable weight to prevent it from moving, it being at the same time raised on supports so that its wheels were clear of the ground. Steam at a pressure of 150 lbs. was then turned on, when the wings made a short series of furious flaps; but, through imperfect workmanship, the left wing suddenly gave way about two feet from its base, when the other wing, being subjected to extra strain, failed also. Mr. Kaufmann states that these accidents were in a great measure caused by the wings having been lengthened three feet previous to the trial, and being thus exposed to a greater strain than they were constructed to resist. The wings having been removed the machine was put to the final test of being run at a speed of 1,500 double strokes per minute, and it was found to be quite uninjured by this experiment. Altogether, Mr. Kaufmann considers the trials to have been satisfactory, and since the trial referred to he has been engaged in the construction of a larger machine on the same principle, but having the beams worked, through gearing and eccentrics, by a horizontal engine. This machine is also to be fitted with shifting aero-planes, and is to be accompanied by a tank-car with accommodation for two persons. It is intended that this machine should rise into the air after a short race on *terra firma*, drawing behind it the tank-carriage; it is to be of 120-horse power, and is to weigh 8,000 lbs. complete. The tender is to carry ten hours' supply of fuel and three hours' supply of water; and with this tender and three cars the machine is intended to make fifty-six miles per hour.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

The Fossil Man of Onondaga--Opinion of an Anatomist.

MESSRS. EDITORS:—I have read with a good deal of interest the accounts I have seen in your excellent paper of the "stone giant," or the fossil man, found on the farm of a Mr. Newell, by some laborers while engaged in digging a well.

Many of the accounts I have seen in the papers are fanciful and wholly imaginary. At first we were told it was a veritable petrifaction, and a full description of the same was given. Next we were informed that it was an "image," the work of the Jesuits; then again it was the work of a Canadian, made in 1868, from Onondaga plaster. Recently I saw an extract from the Syracuse *Journal*, in which was an article signed by James Hall, State geologist, and S. B. Woolworth, Secretary of the Regents of the University, in which it is maintained that it cannot be a petrifaction, because the soft parts of an animal are never petrified, decomposition taking place so rapidly. Now, Messrs. Editors, the above-named gentlemen may be men of science, in their way; they ought to be, occupying the places they do; but it is plain they are not anatomists, or they would never make the above statement.

Decomposition is ordinarily the fate of all animal substances, hard as well as soft. But we have many well-authenticated instances of human bodies, buried in certain localities, becoming petrified. It is not more than four or five years ago that we had an account in the New York papers of the removal of a man, or his body rather, that had been buried six or eight years, when it was found that complete petrification had taken place. No part had even begun to decompose except the end of the nose, and that was very slight.

Besides, I can show Messrs. Hall and Woodworth, if they will call upen me, the half of a human heart petrified, plainly and distinctly to be seen, as any one acquainted with anatomy will admit at once.

I have many other similar petrifactions in my possession.

None of these could, for a moment, be supposed the work of the cunning Jesuits or of a shrewd Canadian, hid in the earth to surprise somebody—but were picked up, some in Pennsylvania and some in Wisconsin—each partaking of the nature of rock common in the region where it was found.

The same thing, no doubt, is true of the plaster man of Onondaga. As plaster or gypsum is common in that region, petrifactions in that locality would, of course partake of the nature of gypsum. I have never seen the stone giant above referred to, but it would take more than I have yet seen to convince me that it is not a fossil man.

Dr. Westcott's communication in your last issue takes the most common-sense view of the subject of anything I have seen. One good anatomist is a better judge of the nature of the curiosity in question than a thousand State geologists or Regents of the University.

Don't let us set a shoemaker to repairing a watch—every man is a judge of his own trade. GEO. W. STONE, M.D.

Warren Center, Pa.

The New English Method of Setting Tires.

MESSRS. EDITORS:—The article headed "A New Method of Setting Tires," in the SCIENTIFIC AMERICAN, under date of Nov. 6, and which you describe as being patented in England, and as to the utility and serviceability of which you seem to have some doubts, has come to my notice.

I not only share your doubts about its general utility, but I assert that its theory is all wrong. It is, in my opinion, an imposition upon the common sense of any intelligent wheelright, and hundreds of them will bear me out in this assertion. It is a violation of the common laws of nature; this alone would be sufficient to condemn the whole thing.

The nature of iron is such that heat will expand and cold will contract it. How could nature come to the assistance of man any way more favorable, especially in that class of machines which combine wood with more or less iron.

What is more simple or requires less time, than to measure the tire, weld it, and allow a certain amount of draw, according to the size and condition of the wheel? Every intelligent blacksmith knows exactly how to govern himself in order not to let the action of the tire be too great in its contraction. I say the contraction should not be too great, as it would strain the wheel out of its natural position, and more or less injure its strength by giving it a constrained dish, which we carefully seek to avoid.

Now this new method makes necessary a procedure which is entirely injurious to the strength and stability of a sound wheel; namely, the unnatural contraction by force of the wheel in order to set the tire. A well put up wheel can only be contracted as far as its elasticity will admit, and to do this

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it would require more power and consequent expense than would be profitable.

Now admitting it could be done as easy and speedily as you can turn over your hand, would that make it any better? No; Sirs. It would only turn out an imperfect and crippled wheel, and we would never get through resetting the tire on the same wheel done by this method, as the reaction of the wheel against the tire would help to loosen it.

Now as to the expense of labor saving, the old method, or the one we work by at present, will also have the advantage in my opinion.

The inventor of this new method surely cannot be a practical wheelwright, or if he is he does not understand the action of the force which the axletree of a vehicle exerts upon its wheel.

A wheel has almost as much (and sometimes more) strain to bear from the horizontal force (caused by the weight) as from the perpendicular. Now the dish in a wheel is to the effect to resist the horizontal force which is brought to bear upon the hind part of the hub, and the more dish the greater is the resistance.

An arch would illustrate this principle well. It is a fixed fact that the more crowned or rounded an arch is constructed the greater weight it can bear. So it is with a wagon wheel. Its dish should be regulated according to the weight it has to carry. Now how can a wheel be expected to stand up to its load when the dish is strained into it. Would not the reaction of the spokes favor the horizontal strain of the axle against the hub and destroy the wheel?

I could enumerate a great many more minor objections which I have to this new method, but I think I have said enough to convince any one of its entire fallacy, both scientifically and naturally.

I don't mean to say that the apparatus with which the inventor conducts his work and sets the tire, is beneath any notice. Not at all. It must be a very ingenious contrivance and well worthy of attention, if he can set a tire cold upon a wheel and do a good job. E. QUAST.

Freedom, Mo.

Railroad Accidents by High Wind.

MESSRS. EDITORS:—Occasional accidents by trains lifted by gales of wind and thrown from the track, may render a simple safeguard desirable. A recent case of this kind occurred at Boston Corners, on the Harlem Railroad. A high velocity makes the train more subject to this action of the wind than slow motion; for revolution or motion at a great velocity detracts from the weight of bodies, as a spinning top, leaning in any direction, plainly shows. This is more obvious even if the rapidly vertically revolving heavy top, or wheel, is supported only at one end of the horizontal axle, and kept in suspense till slackening of the speed permits it to drop. Locomotives are known to have leapt at a high speed horizontally across the chasm of open drawbridges, etc. The bending of the iron rails under a passing locomotive or car at low speed, may be considerable at slow motion, but imperceptible at high speed. Pieces of a bursting grindstone or fly wheel, or of an exploding boiler, or in a gunpowder explosion, are almost invariably hurled upwards. The boomerang of the New Zealander practically applies the same fact. Whatever the explanation of the phenomenon, the facts are established beyond controversy, that a great velocity of bodies detracts from their weight.

The prevention of the above railroad accidents may be found in slacking speed at places particularly exposed to the fury of a sweeping gale. R. H.

How to Braze a Band Saw.

MESSRS. EDITORS:—I send you a method of brazing band saws, which may be of some use to some of your numerous readers.

The tools required are a small portable forge, brazing clamps, etc., and a straight edge, 4 or 3 ft. long, also some small brass wire, and powdered borax. Take the saw and cut it to the proper length, scarf the ends from one half to three fourths of an inch, then put the saw in the clamp (I would say that I use a very small and simple clamp in the shape of a double vise), keeping the back of the saw out of the jaws of the vise, or clamps, and apply the straight edge to the back, as it is very necessary to braze it straight. Make the fire in as small a compass as possible, place the clamps directly over the center of the fire, and then put on three pieces of brass wire, bent in the shape of the letter U, so that they will pinch the laps together; put on as much borax as will stay on the saw; cover the whole with a piece of charcoal; let the brass melt so it will flow over the saw, before taking it off the fire, and cool very slow so as not to make the braze brittle. File off what brass remains on the saw, and it is ready for use.

I send you a piece of saw that has been in use several months, and has never broke in the braze.

RUSSELL WHITNEY.

Fitchburg, Mass.

[The sample sent is good evidence that the method described by our correspondent is an excellent one.—EDS.

The Choking of Gas Mains by Naphthaline.

MESSRS. EDITORS:—In my last communication, I endeavored to substantiate the view, that the destruction of the wood-preserving establishment, in Brooklyn, occurring on the 26th of October, must have been caused by the obstruction of the pipes, leading from the still into the chamber containing the timber, with naphthaline. In glancing over Colburn's "Gas Works of London," I find the following passage, which bears relation to the subject, and which I therefore quote here: "We ought here to notice the presence of the vapor of naphthaline in gas, and which begins indeed, to deposit in thin, micaceous-looking scales of exceeding lightness, almost at the moment when the gas leaves the purifiers. Indeed, large patches of naphthaline flakes may often, if not generally, be found on the undersides of the lids of the purifiers themselves, and this singular substance will often choke the largest main so as to almost entirely prevent the passage of the gas. A blast of steam turned into the mains will disperse the obstruction, but a sort of chimney-sweeping contrivance, called a 'cat,' is oftener employed to open the great routes of communication between the gas works and the consumers. Fortunately, too, naphthaline is seldom deposited at any considerable distance from the works, and it can generally be cleared out without going off the premises." ADOLPH OTT.

New York city.

Improvements in Farm Implements.

MESSRS. EDITORS:—During the summer you requested any of your readers to suggest improvements in farm implements, or anything else that was practically useful. In accordance with that request, allow me to make the following suggestions:

The only objection to our corn planters is that they drop the seed in a *lump*. There are two objections to this. First, the greatest enemy a plant can have is one or more of its kind growing close to it, thereby using the same nutriment. The second is, that the plants cannot be weeded or hoed as conveniently as if separated to a proper distance. I therefore suggest that inventors make a planter to drop the seed at least three inches apart in a line, thus: . 3 . 3 . A machine to do this properly will supersede all others as well as the old, yet, so far, best plan of hand dropping.

There is a great want of some practical, effective, and cheap plan of attaching three horses to one plow. It is much needed in deep or trench plowing, which, in conjunction with draining, must be resorted to in old and high-priced lands to make them pay.

We also want some of those English steam plows (it is a disgrace to inventors that we do so), with attachments, to do the mowing, harvesting, and thrashing. We can then furnish England cheaper wheat for her plows.

We want an arrangement to water beef cattle and other stock in the cars in transit from shipping points to Eastern markets. This will be a much better sanitary measure than excluding good, healthy, and cheap beef from the southwest. It seems as if the breeder of fancy stock feared the competition of Western stock, which would certainly cheapen beef for millions of operatives. The road that first adopts this plan will receive the preference over all others. This plan is in use on many of the English roads where the distances cattle are carried are short, and the climate mild compared to that of this country.

I suggested the present horse corn cutter some years ago, and now it is nearly perfect. JAS. HARKNESS.

St. Louis, Mo.

Filing and Setting Mill Saws.

MESSRS. EDITORS:—I have noticed recently several articles upon filing saws, hand and cross-cut, but nothing about mill saws.

I have been running and superintending saw mills several years, both circular and sash saws, and my experience is, that a bevel-pointed tooth is the best for general use. In filing, I hold the file at an angle of 10 degrees on the bottom or front of the tooth, and square or flat on top; changing sides or hands every alternate tooth, then bending or setting the tooth point outward sufficient to keep the saw clear. This method obviates the necessity of swaging, which is a great saving in time and labor.

I have gained much information from the SCIENTIFIC AMERICAN, but have never written you before.

Eufaula, Ala. JAMES R. POSTON.

Valuable Testimonial Letters.

MESSRS. MUNN & CO., *Gentlemen:*—Your esteemed favor of the 10th, inclosing certificates of allowance of English and French patents on my high and low-water detector, was received on Thursday.

The very satisfactory manner in which cases are prepared by your Patent Agency, and your facilities for obtaining American and foreign patents is certainly all the inventor could desire. On the 11th day of August, 1857, my first patent was issued from the U. S. Patent Office, through your Agency, since which time I have obtained *thirteen* American and *eight* foreign patents; *sixteen* of which were obtained through the Scientific American Patent Agency. In every instance I have found your drawings and tracings artistically executed, specifications able and full, and claims broad; and in no case have you failed to obtain a patent on my petition.

In conclusion, I began to assure you, that it will always be a pleasure to me to be able to advance your interests as patent attorneys and mechanical journalists, knowing as I do, that the inventors' interests will always be safe in your hands.

Very respectfully, your obedient servant,

G. B. MASSEY.

New York city, Nov. 12, 1869.

A Voice from the West.

Gentlemen: I was agreeably surprised to-day on receiving a letter from you stating that my patent was allowed. You have done your work nobly and well. I can but return you my sincere thanks for your promptitude and energy in conducting my case, and I must confess you have converted me into a walking advertisement for your interests in this wooden city of ours.

Your valuable journal and I have been companions for the last five years, and now I cannot live without it. It has grown with me from boyhood, and I've always found it instructive and entertaining in my journey through life.

Chicago, Ill., Nov. 13, 1869. J. F. DUFFY.

For the Scientific American.

OXYGEN AS A SOURCE OF HEAT AND LIGHT.

BY ADOLPH OTT.

Heat and light, in their application to the manifold purposes of life, are subjects of vast importance. As regards heat, an inexpensive process for producing high degrees is much in need; and with respect to light, it is a brighter and cheaper form of artificial light that is not liable to charge the air with carbonic acid which is wanted.

The brilliancy of illumination, as well as the high degrees of temperature afforded by the combustion of various gases in oxygen has, for many years past, led to zealous attempts to produce this gas at a cheap rate. There is, indeed, no want of oxygen; it exists in immense quantities. The atmosphere surrounding our globe consists of one fifth in bulk of this gas, and eight ninths of the weight of water, of which there is also no scarcity, is oxygen. But, in spite of all efforts bestowed upon the opening of these magazines for the uses referred to, the problem of the cheap separation of oxygen has only lately been solved.

This discovery is due to two enterprising Frenchmen, Messrs. Tessié du Motay and Maréchal; and it first excited attention at the time of the late Exhibition at Paris. Two substances, one a mineral, the other a product of manufacture—peroxide of manganese and chlorate of potash—have ordinarily been the source of oxygen; this gas can be evolved from them with ease; however, this process is too costly for use in the industrial arts. Besides this, various methods for producing oxygen have been proposed up to the year 1867. The one best known is, perhaps, that of Boussingault, which is founded upon the regeneration of the binoxide of barium. However, this process is now abandoned, chiefly on account of the cost of the crude material.

Some years ago, Messrs. Saint Claire Deville and Debray were requested by the Russian Government to search for a better process for separating platinum from its ores. This metal can only be fused before the oxy-hydrogen flame, and there being large quantities of oxygen needed, a new mode of generating it, had to be sought for. The one proposed is based upon the property of the sulphate of zinc—a by-product of the cells of galvanic batteries—to split up into oxide of zinc, sulphurous acid and oxygen, when subjected to a red heat.

The separation of these two gases is easily effected, since the one is absorbed by water while the other is not. The production of oxygen from the source referred to is very regular and unattended with danger; moreover, it is economical as compared with those commonly employed by chemists; in the experiments of Deville and Debray, the cubic meter (35·316 cubic feet) of oxygen when prepared from chlorate of potash could not be obtained for less than ten francs (two dollars in gold); from manganese for not less than four francs, and in the last-described process, the price of one cubic meter amounted to only one franc and a half. By the discovery of Messrs. Tessié du Motay and Maréchal the cubic meter of pure oxygen may now be produced for less than four cents, gold; at least it is sold to the gas companies in Paris for twenty-five centimes (five cents, gold) per cubic meter. We are consequently in possession of a process by which oxygen can be got at only one fiftieth of the cost of that ordinarily employed by chemists in their laboratories!

The process of the French chemists is founded upon the fact that the manganate of soda at a red heat gives off a part of its oxygen when steam is passed through it, and that it re-absorbs oxygen when atmospheric air is passed through it. This process may be represented by the following formula:

2 (Mn O_3 Na O) (manganate of soda) + 2 H O (water) = Mn_2 O_3 (oxide of manganese) + 2 Na O, H O (hydrated soda) + 3O (oxygen).

According to this formula, the manganate of soda is capable of producing fourteen and a half per cent of oxygen in weight, and since the oxygen is 737 times lighter than water, from one hundred pounds of the crude product there can be generated 1,348 gallons of oxygen, or something over five hundred cubic meters.

With regard to the application of oxygen for illuminating purposes, it was first made in the square fronting the Hôtel de Ville, one of the finest government buildings in Paris. This experiment, which lasted for about two months, not only met with perfect satisfaction, but also procured the patronage of his Majesty Napoleon III., who, for a second trial upon a still larger scale, ordered the court of the Tuileries to be illuminated by means of the oxy-hydric light. The grounds of that palace comprise in themselves an area of 30,000 square meters; besides, it has been introduced into one of the most spacious theaters of Paris, "La Gaité," in the Alcazar, and in various stores and workshops.

The light itself is produced by directing a jet of a mixture of oxygen and hydrogen or oxygen and street gas upon cones of zircone, a white earthy body, which has proved far superior to either lime or magnesia, that serves in the Hare, Drummond, or Calcium light.

As regards the lighting power, it is seven times greater than that produced by an equal quantity of street gas; indeed, the streets may be so brilliantly lighted with it that a newspaper can be read with perfect ease in a street car. Dr. Miller states that the oxy-hydrogen light can be seen at a distance, in a right line, of 112 miles. Navigable rivers might be cheaply and perfectly lighted their whole length;

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and for churches, workshops, theaters, and other spacious rooms, there is perhaps no mode of illumination better adapted than the new light. And, since the flame, when directed upon a solid, earthy body, it produces an emission of luminous, instead of caloric rays the objection that it would heat, the room in which it is burned, falls to the ground. But, in another point of view, the new light is far preferable to any other form of artificial light—we mean in regard to health. According to experiments recently undertaken by Dr. Zoch, in Germany, the quantity of carbonic acid produced by a common gas flame in a room of the capacity of 2,540 cubic feet, may rise to the proportion of three parts to the thousand—a quantity generally supposed to be possible only in hospitals, prisons, and garrisons; and what shall be said when it is considered that, in an ordinary parlor as many as three burners are kept constantly lighted for five and six hours and with an inferior quality of gas at that? With respect to the oxy-hydric light, since the product of combustion is simply watery vapor, no vitiation of the air can possibly take place.

As regards the application of oxygen for the production of heat, it may be stated that hydrogen, when being inflamed with oxygen, generates the highest heating effect known, with the exception of that of the electric discharge. This is due to the rapidity of the combination of these gases. Some years ago, by the construction of a close furnace of lime, and the use of the oxy-hydrogen blowpipe, MM. Deville and Debray were able, not only to volatilize many of the supposed fixed impurities in commercial platinum, but with about forty-three cubic feet of oxygen they have succeeded in melting twenty-five pounds of platinum in less than three quarters of an hour, and casting it into an ingot, in a cake mold. And much larger quantities of platinum have more recently been fused by the same means. According to Brand and Taylor, silica and all metals are fused, and some of them entirely dissipated in vapor by the intense heat produced under these circumstances.

The temperatures of various flames are, according to Prof. Bunsen:

Oxy-hydrogen flame	14,541° Fah.
Hydrogen	5,898° "
Carbonic oxide	5,507° "
Coal gas	4,262° "

There remains no doubt that oxygen will soon play an important part in various branches of metallurgy, and those fully conversant with its properties, predict for it not less conspicuous uses in other branches of art.

"HOW TO OBSERVE THE SUN."

[BY J. N. FARRAR, D.D.S.]

On page 310, current volume, I noticed an article alluding to a former one on page 189, "Storms on the Sun," for the purpose of showing simultaneous "electric disturbances" about our planet, which gives further hints of a simple and good method for obtaining a comparative correctness of statistics of the solar disturbances noticed through a telescope, by means of reflecting them upon a screen. I will quote two paragraphs:

"Believing that a simple means of observing and accurately recording solar phenomena could induce amateurs as well as professionals, to keep such records, I respectfully propose the following method, which I never have heard of being thus used by any one before. Take an astronomical reflecting telescope with a Huyghenian eye piece, into a dark room, direct it on the sun through an aperture, push in the eye piece until it is between the object glass and its principal focus, now place a fine white screen at some distance from the eye piece and focus sharply, a large, clear, well defined, erect image of the sun is thus obtained, which may be enlarged or diminished at will, arrange the aperture, increasing or decreasing the light, until the finest details are visible. The sun can now be examined without darkening glasses, and by several persons at once.

"For uniformity of record I would suggest the adoption of one regular size, say a circle inscribed within one square foot divided into square inches; the space being numbered from right to left, and from top to bottom. The exact position of any disturbance observed could thus be easily ascertained and recorded."

The idea of reflecting solar spots, etc., upon a screen, is excellent but not new. While attending the Elmira Astronomical Observatory, at Elmira, N. Y., during the spring of 1862, and desiring to make some solar observations, this plan was adopted for most of them, but was not original with me. The writer is under the impression that this process is old.

I made a long series of observations on the sun at this time, and with considerable effort made a different sketch of the sun's appearance every day, when the weather would in any way permit, and at exact time. My reflected representation of the sun was about ten feet in diameter, and my pictures were made one foot in diameter. The central spot or nucleus was made with black ink, the penumbra with lead pencil, while the faculæ were represented with white crayon. It must be understood that straw colored paper is essential for the best representations.

The disturbances of the solar photosphere are very interesting to young students, and are becoming more interesting with all astronomers, as the time approaches for the great expected display of spots of 1871, when, from all accounts, the sun is to become quite "speckled," or at least great magnetic disturbances are looked for.

Sometimes (though rarely) no spots are visible on the sun, again, one may be seen, at other times quite a large number may be seen scattered all along the equatorial belt of 70 degrees in width. Spots outside of this belt are very rarely seen. The disturbances of the luminous portion of the solar atmosphere, if I may be allowed to use the term, are noticed upon the screen in curly streaks of bright light, in irregular shapes, resembling waves on a lake during a sunny, windy day, and particularly plain near and around the spots, resembling much the tumult and circular waves round a place where a large stone has been dropped into a pond of water.

I noticed, whenever I saw a good deal of facular disturbance, in any quarter, there generally followed spots in a few hours. This is so characteristic that it is easy to foretell the appearance of some larger spots, one or two days before they appear around the approaching limit, that is, before they appear in sight, as it is supposed all know the sun revolves on his axis once in 25·34 days, which continually brings new spots into view.

Some days scarcely any facular disturbance could be noticed on the ten-feet reflection on the screen, while on other days it could be distinctly seen covering the whole zone of 35 degrees each side of the equator.

On January 27th, the same season (1862) my brother, in company with myself, noticed the whole face of the solar orb covered with enormous disturbances of the photosphere, from pole to pole, and from limit to limit, entirely mottled with wave-like shades. On this occasion fifteen spots were visible, two of which were very large; undoubtedly a more powerful glass would have revealed many more. The faculæ on this occasion like most other days were more agitated and greater as they approached the equator.

The instrument used in these observations was Fitt's 8-in. Acromatic Equitorial Telescope, erected by Professor C. S. Farrar.

I used a prismatic eye piece to reflect the object upon the screen. Although these representations were very good and convenient, yet I found I could get a finer line and more correct idea from views seen directly through the telescope, by using two or three colored glasses between the eye and eye piece. This is, however, a dangerous plan, as the colored glasses sometimes break from intensity of heat, and the loss of an eye may be the result, as has been the case before. Great care should be exercised in viewing the sun directly through a powerful telescope.

The proposition of a checkered field upon which to throw the image of the solar orb seems to me good. The writer would kindly suggest in addition to the plan of the author of the article above mentioned, that the cross line check be made comparatively small and light, and be secured to the telescope, so that it will keep pace with the motion of the earth on its axis, and hold the whole picture upon the screen in juxtaposition, and not necessitate a constant adjusting anew of the telescope, as would be the case if the screen held the lines, having prepared everything in this manner, a comparatively accurate sketch of every visible disturbance can be conveniently made in a book, whose pages are correspondingly checked.

[For the Scientific American.]

THE MANUFACTURE OF LOOKINGGLASSES AND MIRRORS.

One of the most singular wants of man, but especially of woman, is to devise means to ascertain how her personal image appears. From the fountain, in which Narcissus looked at himself, to the bureau with lookingglass, many plans have been tried.

The first artificial mirrors were made of metal, and were discovered at a very early period, and must have been contemporaneous with the art of polishing flat surfaces.

At this date, lookingglasses are used every where—even as ornaments on horse collars, in Europe.

As ornaments, lookingglasses look beautiful, reflecting, as they do, daylight and artificial light, and thereby flooding sumptuous apartments with a deluge of light. They seem to enlarge small apartments. When not silvered, but simply polished and left transparent, they give to store fronts and windows a cleanly and bright appearance not attained by common window glass. Used between two parlors, they are one of their most beautiful applications. Since the wonderful invention of Daguerre, and especially, latterly, large quantities of small cast glasses are made for photographic purposes. As to imperfect glasses, not suitable for polishing, they are used to form walls through which light freely traverses to rooms which require to be lighted but closed; they may also be used for floors, roofs, etc., etc.

The use of lookingglasses has increased wonderfully, and this increase is owing, in great part, to a notable reduction of price, the consequence of an invention of Abraham Thérart, a French artist, who, in 1688, conceived the bold undertaking of casting glass as it was practiced with metals. This new manufacture made such wonderful strides that, three years afterwards, a company was formed to carry out this new manufacture; and, in 1691, the establishment was transferred to St. Gobain, where it is in existence to this day, and is manufacturing a very superior article. St. Gobain, by the beauty of its glasses, by their relative cheapness, and the ability of its managers, has retained the monopoly, almost exclusively, of the French market, and has, besides, maintained a rank abroad not to be excelled by others, notwithstanding the active competition of Belgium and England. This factory has six strong competitors in England, especially in lookingglasses used for windows. The oldest is located at Raven Head, near St. Helens, South Shields. The Thames Co., the British Co., and three other factories, two of them situated in Lancashire, and the last one at Smitherick, near Birmingham, with the two first named, manufacture more than two hundred thousand square meters per year. The most important factory of the Continent, after St Gobain, is situated at Sainte Marie d'Oignies, near Charleroi, in Belgium.

In 1860, St. Gobain alone manufactured two hundred thousand square meters; the six English factories, three hundred and fifty thousand meters; Belgium one hundred and ten thousand, and Manheim seventy thousand.

The lookingglass manufactures, in France, have a capital of 50 or 60 millions engaged, and employ 5,000 workmen simply on the manufacture of the glass proper, not including those employed on the separate branches of business depending upon it. This branch of manufacture has attained such a state of perfection, that, at this day, prices are 60 per cent lower than twenty years ago and 32 per cent lower than five years ago.

From experiments made, the following shows the relative position of French and Belgian manufactures.

To manufacture a square meter of glass, the following is required:

(In Sainte Marie d'Oignies, Belgium.)

To melt 118 kilogr., soft coal at 13f. 50c. tun	2f. 38c.
" polish 195 " " " 8f. 58c. tun	1f. 65c.
Total	4f. 03c.

(In St. Gobain, France.)

To melt 180 kilogr., soft coal	3f. 96c.
" polish 195 " " "	2f. 94c.
Total	6f. 90c.

If we complete the estimates of the last price by adding the price of the chemicals, the sand, the chalk, and the pot-making, and by adding the labor, we arrive at the following cost prices of one square meter:

Sainte Marie d'Oignies, Belgium	17f. 54c.
Ruquignies, France	20f. 34c.
St. Gobain	21f. 61c.
Cirey	23f. 97c.
Montlugon	21f. 61c.

By adding the interest on the capital invested, the last price is raised to 27 or 28 francs per meter, and is sold in Paris at an average of 34 to 35f.*

It is a well-known fact, that the United States, with its immense resources for this branch of manufacture, has not succeeded, yet, in producing a merchantable article in this line. What is wanting, then, to manufacture it successfully here? We have sands, beautiful and much superior to the European article, although England draws a large quantity of it all the way from Australia; we can manufacture our sodas in this country as cheap as in Europe; we have coal in plenty; we have the capital; therefore, what we want is men capable of managing the work and skillful workmen. Ability and love of work are oftener wanting than capital. This class of men, however, is often left at the mercy of men unacquainted with the business, and oftentimes of bad faith, who can not, or will not, wait for the slow but sure profits of labor, and who simply take hold of the business as a speculation, as it were, caring nothing about the artistic excellence of their employés, but would part with them at any time if they thought they could make a dollar by it. These, I think, are a few of the reasons that discourage skillful men from coming to this country.

A manufacturer of lookingglasses would find it to his advantage to locate near the ocean, where he could receive his raw materials, and would be near large markets for his wares, and could, also, make up some of the materials used in manufacturing. Saint Gobain, in France, manufactures its own sodas, emery, colcothar, and tin sheets. They buy the tin in Amsterdam, from the Dutch Indian Company. This company only sells at wholesale. They get the mercury from Spain.

If we cite these facts, it is to establish a comparison between a factory located in Europe, and one in this country, and to show the advantages of a location on the ocean border. We will give an example of these advantages. Sodas might be made on the spot, and would thereby save a vast amount in freights, as soda is obtained from sea salt by transforming it into sulphate of soda, then the sulphate into carbonate. In this latter state it contains a large quantity of water—from 62 to 66 per cent—so that 100 pounds of this salt represents only 34 to 38 per cent of dry carbonate of soda. A factory, making this carbonate on the spot, would save the freight, not only of the pure carbonate, but, also, of the 6-10ths of water it contains.

We have, in some of the Southern States, sand suitable for glass-making, and, also, fire-clay suitable for making the pots (crucibles), which have not been tried properly, heretofore, but, by being properly mixed, would answer the purpose as well as the German clay that we import at a heavy cost.

We therefore say, unhesitatingly, that a lookingglass manufactory, well managed, must be profitable in this country.

Washington, D. C. J. P. COLNE.

WATCH-SPRINGS.—It has recently been discovered that the springs of chronometers and watches, which are constructed of steel, are frequently magnetic. Steel is at all times liable to become magnetized from causes beyond man's control. Watch-makers are advised to test their springs as to magnetism by placing them near to a very small and truly balanced mariner's compass. If the spring exhibits in none of its circumference any tendency to move to one pole of the compass more than the other, it may be considered free from magnetic influence; on the other hand, if the North pole moves to one part, and the South pole to the other, the spring is decidedly useless; for in whatever position the time-keeper may be placed with such a spring, it will be affected by the earth's magnetism.—*Septimus Piesse.*

*A square meter equals one and one fifth square yards, nearly. A kilogramme is two and one fifth pounds avoirdupois nearly. A centime is on hundredth of a franc.—EDS

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THE GREAT ST. PANCRAS RAILWAY STATION.

This week we give an engraving of the interior of the new St. Pancras Station, Midland Railway, London. Occupying, as it does, a site of nearly ten acres, it is undoubtedly, if not from an architectural, at least from an engineering point of view, the finest terminus in the world. Its most interesting and peculiar feature is the roof. While it has the widest span of any roof in existence, the space beneath is unbroken by ties or braces, common to all others. Its style is subdued Gothic, with segments meeting at its crown. As shown in the engraving, the roof springs from the platform level, the principal ribs each having the form of a four-centered arch, the radii of the curves being 57 feet and 160 feet, respectively. The two central curves—those of 160 feet radius—meet at an angle in the center at a hight of 96 feet above the platform level. The length of the roof is 690 feet with a clear span of 240 feet, covering five platforms, ten lines of rails, and a cab stand 25 feet wide, thus making a total area of 165,600 square feet. Its hight at the ridge is 125 feet above the level of the road. There are twenty-five principal ribs in the roof, each weighing about 50 tuns. Between each of these, which are about 29 feet 4 inches apart from center to center, are three intermediate ribs, carried by trussed purlins, constructed so as to stiffen the bottom flanges of the main ribs laterally. The station walls rise behind the spring of the principal, the space at the top being filled in with open iron-work.

The roof is glazed about 70 feet on each side of the center, and the remainder is covered with slates on boarding one inch and three eighths thick, grooved and tongued and chambered, the underside being varnished. The slates are best Welsh, and securely fastened to the boarding with copper nails weighing about 7 lbs. per 1,000. The lap is not less than 3 inches. The timber work throughout is well protected by varnishing, painting, or Burnettizing, according to the situation in which it is fixed.

The transverse girders which support the floor of the station take the thrust of the roof. They are connected so as to form continuous girders across the station. Besides being tied to them, the feet of the ribs are each secured by four 3-inch bolts to an anchor-plate built into the wall and strongly fastened.

The rail level of the station is about 17½ feet above that of the adjoining streets, thus affording very extensive cellarage. The hight of the basement story is 13 feet 6 inches, and under this basement the connection of the Midland line is carried to that of the Metropolitan system. To enable vehicles to reach the station level from the street, inclined approach roadways have been constructed on arches. Each side of the station is flanked by a row of picturesque shops and other buildings. The platforms have edges of dressed stone, and are floored with red deal planks, dressed, close-jointed, and tongued with hoop iron. The decorations include a tesselated frieze about two feet deep, inlaid with colored tiles, and a dado round the base to the foot of the principals. The molding above the frieze is surmounted by an iron cresting of floral design, the leaves to curve inward from the cornice. The lighting arrangements of the station are very effective. They were intrusted to the Messrs. Sim and Barff, of Parliament street, London, and to their patent hydrocarbon process is to be attributed the brilliant light obtained, while a saving of sixty per cent is said to be effected.

In the construction of the station about sixty millions of bricks, 80,000 cubic feet of dressed stone, and many thousand feet of glass and timber have been used. Over 9,000 tuns of ironwork have been employed, the weight of some of the principal portions of which are given as follows:

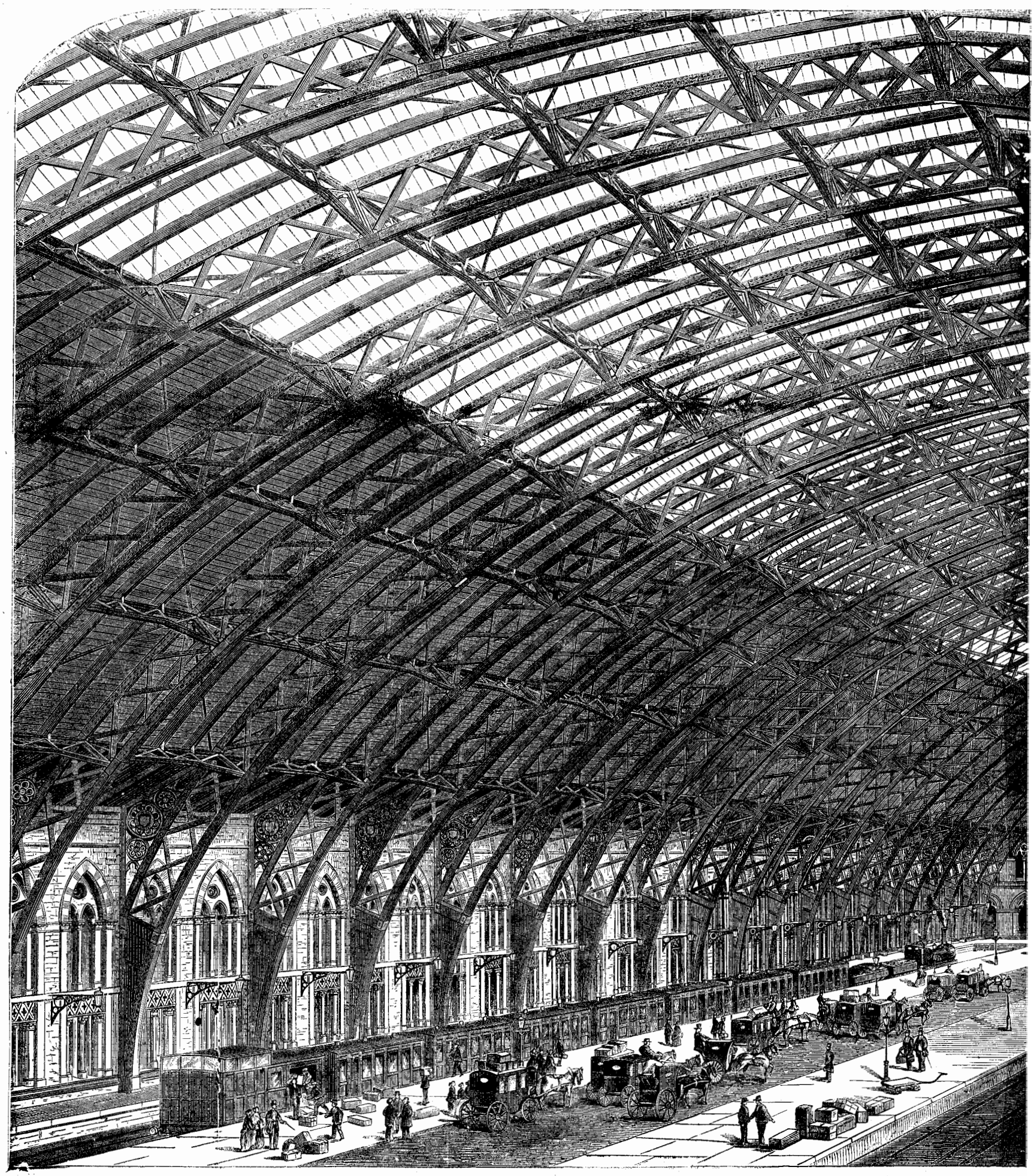
	Tuns.
Main-floor girders	500
Intermediate	390
Cross-girders of floor	1,020
Buckled plates	820
Main roof, ribs, and spandrel framing	1,270
Intermediate ribs	320
Purlins and connections between ribs	230
Cast-iron columns and caps below flooring	1,080

The traveling stage and hoisting gear, by means of which the ribs and roofing were erected, were very ingeniously designed by J. G. N. Alleyne, of the Butterley Iron-works. The principle on which he acted was never to lose hold of the main rib until the wind ties were finally fixed to the walls. The staging was divided into three sections, the center consisting of six divisions, the side ones of five divisions each, and from front to rear there were four divisions. The standards consisted of die-square backs of timber, 12 inches square; the horizontal traverse pieces were double 12 inches by 6 inches each, except the lower one, which was 12 inches square, with iron shoes bolted down to receive the feet of the standards and braces. These were connected by cross braces, and the whole was moved, either together or separately, on 123 wheels, each 2 feet 8 inches in diameter, turning on a balk of timber 18 inches square. A large hotel is being constructed at the end of the station.

THE ORIGIN OF CANDLES.

The tallow candle is the offspring of the tallow torch used in the twelfth century. When tallow candles were first introduced their cost was so great that only the most wealthy could afford the luxury, and it was not till the fifteenth century that they were sufficiently cheapened to come into general use.

Think of a tallow candle—that dripping, guttering, greasy thing, being considered a luxury. But the tallow candle, now used only where more convenient and economical lighting materials cannot be obtained, is, as we now know it, no more to be compared to the candle of the twelfth century, than the best illuminating gas to lard oil. Its wick was of tow, hard to light, and burning so rapidly as to melt a large portion of the tallow into rivers of oil, so that the drip of four candles would buy a new one.



INTERIOR OF THE FINEST

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What would the quaint old revelers of that period have thought if, in the midst of one of their drinking bouts, their tallow dips with tow wicks could have been suddenly eclipsed in the splendor of the oxy-hydrogen light of to-day. Verily, both the physical and mental darkness of that age has given way to the light of a brighter and nobler period.

Can it be that in centuries to come, the luxuries of the present will be regarded as contemptuously as we now regard the obsolete appliances of the middle ages?

LIFE-SAVING GUNS.

We find in the *Army and Navy Journal* an interesting article on "Life-saving Guns," a title that might at first seem paradoxical, as guns have been and still are employed chiefly for the destruction of life. The inventions noticed in the article are all of foreign origin. The first one mentioned is that of M. August Deloigne, of Paris. "This gun is a bronze casting, about one foot long 1 1-6 inches bore, and weighing about 66 pounds, without trunnions or carriage. Screwed into the breech is a tail-piece of iron, nine or ten inches long, which, when the piece is to be fired, is thrust into the soil at an angle of about 30 degrees. For long ranges, when firing to windward, arrows of iron are used as projectiles, and for short ranges, or for long ranges when firing to leeward, wooden arrows, which are to be preferred, as they will float. The lower or inner end of these arrows nearly fills the bore and is covered by metal which expands into a collar or rim, considerably larger than the bore, and coming nearly down to the muzzle when in place, so as to receive the full force of the explosion. Projecting out a foot, more or less from the collar, is the main body of the arrow or 'fléche,' consisting of a round or eight-sided stick of ash, about double the diameter of the bore of the gun. To this is attached the line.

"In the 'Manby mortar,' the use of which has given way to the Boxer accelerating rocket, the weight of the shot is about 1-5th that of the mortar itself, which weighs about 150 or 160 pounds. In the 'Porte Amerres,' lately got up by Deloigne, the wooden arrows are twenty to thirty meters in length, and weigh ten to twenty times as much as round projectiles, although suited to the same bore. The bore is longer in proportion to its diameter, than that of a mortar, it is actually shorter than the bore of a mortar of the same weight. The result of this is, that for the weight and caliber of the new piece, the metal is very thick, and is capable of great resistance, and therefore admits of heavy projectiles with proportionate charges. The power of resistance is greatly augmented by the peculiar mode of charging, and of firing the charge. An empty space is left behind the cartridge, varying according to the weight of the projectile, and the fire is introduced into the forward end of the cartridge.

"In 1865, Mons. Deloigne made some experiments, under the authority of the French Minister of Marine. The guns used were common 30-pound navy guns, six in number, and as nearly alike as possible. Two were charged as usual, with 7 1-2 kilos. of powder, and an elongated projectile weighing 45 kilos., an excessive charge; one of them burst at the eleventh, and the other at the twelfth fire. Two of the pieces had a space equal to 16 centimeters behind the cartridge of 7 1-2 kilos. and the shot of 45 kilos.; one of them stood 167, and the other 178 fires. The two others had a space of 20 centimeters behind the same charge; one burst at the 108th, and the other at the 162d fire, showing a great gain in firing heavy projectiles by Deloigne's process.

"The present swivels in actual use in the French 'Societe de Sauvetege,' are loaned from the public arsenals, and are not the best arms for throwing lines. They weigh about 80 kilos., and when in use as naval guns, they throw a small round ball, about one pound caliber, weighing about 500 grammes, with 130 grammes of powder. This arm when loaded by Deloigne's system, carries an iron arrow, 1 1-2 meters in length, weighing 5 kilos., with a charge of 140 grammes. No accident from bursting has ever occurred. The new gun, from its extreme simplicity, and cheapness of manufacture, being nothing but a block of gun-metal with a hole through it, with a 'monkey tail' screwed into it, is admirably adapted to the requirements of humane societies and life-saving benevolent associations. When it is to be used on the deck of a vessel, or on rocky ground, it is put upon a rough solid block of wood shaped like a quoin. This block may also be useful to use on very sandy soil, or anywhere where the heaviest charges are used. As the arrows project considerably from the gun, there is no difficulty in aiming sufficiently well to throw a line across a vessel in ordinary times.

"This system of communicating by throwing lines is not only available to establish communication with wrecks, but will be found very useful for tugs, wrecking vessels, revenue cutters, and vessels of war. The system is carried out extensively in France all along the coast, and at bathing places, and is not limited to any size of arm. The wooden arrow can be used from any gun, smooth-bore or rifle, down to a common carbine out of which Deloigne throws arrows as long as the gun itself, carrying a small line of about 100 yards. Mr. Forbes writes that he saw at Vincennes an arrow of the size of a handspike, thrown from a common 4-pound rifle field-gun, about 300 yards. Across the outer end of the arrow, when it started, were two tough iron straight bolts, 1-2 an inch to 5-8 in. diameter, and about a foot long. These bolts stand at right angles to the arrow; the shock at the start bends them to an angle of 45 degrees, and forms a grapnel.

"The 'coulant,' or 'becket,' consists of five or six turns of line round the arrow, just tight enough to allow the line which over rides these turns by a double loop, to pull it down to the butt of the arrow, and thus steady it on its mission of mercy."

WAY STATION IN THE WORLD.

ANY project of the people of Washington to raise $200,000 or $300,000, or any other sum, to hold an International Exhibition in that city, is very praiseworthy. But appealing to Congress for authority to raise half a million by taxation, for the same purpose, is quite another matter.

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WHAT WE HAVE DONE IN 1869, AND WHAT WE INTEND TO DO IN 1870.

We promised at the commencement of the present year to give increased value to the SCIENTIFIC AMERICAN, both in quantity and quality of the illustrations and general reading, and added the hope that with the hearty co-operation of our many friends we should greatly increase our circulation.

We have fulfilled our promise, and are happy to say that our hopes have not been disappointed. Numerous correspondents have expressed their satisfaction with our paper in such hearty terms as show our efforts in their behalf are thoroughly appreciated.

During the coming year we shall take still another step forward, and shall devote increased attention to the illustrations of foreign inventions, machines, designs for machinists' tools, and all matters of general industrial interest, at home and abroad. In doing this we shall incur a large additional expense, but we are resolved to spare neither pains nor expenditure to make our paper the most splendidly illustrated industrial journal of the age.

To reimburse us for this prospective expenditure, we must either increase our subscription list, or raise our subscription price. Our paper is now unparalleled in cheapness. Nothing approaching it in value is published anywhere in the world at our subscription price. Still we are resolved not to advance the rates. We rely upon the efforts of our friends to increase its circulation. Remember that for every subscriber you send us you will be remunerated in the increased value of the paper itself. Besides this remuneration we offer extra inducements in the cash prizes and splendid steel engraving, advertised in another column. The picture of some of the greatest geniuses of our age, is one which will adorn any gentleman's library, and nothing could be a more fitting ornament for an inventor's laboratory.

Those who intend to compete for the premiums offered in another column should be wide awake. We have already received encouraging letters from subscribers who propose to get up clubs, and the prospect is good that the work will go bravely on.

We are moving onward, Friends, and we mean to keep moving, and we here pledge ourselves that the SCIENTIFIC AMERICAN for 1870 shall keep march with the age in all that can adorn or improve it.

BRAIN AND MUSCLE.

It is an old proverb that what "one has not in his head he must have in his heels." This proverb is applicable to those whose memories are so treacherous that they find it necessary to go many times to perform what might have been done in once going. This old saw might have been made more comprehensive, at the expense of alliterative force, by changing it to "what one does not possess in inventive forethought he must make up for by muscular strength."

The intelligent, contriving workman, though his physical frame may be slight, is more than a match for the stupid, unthinking one, in any kind of work depending upon aught except blind strength. The former rises and the latter sinks in the scale of value, just as naturally as oil rises to the surface of water.

A man may expend a vast amount of muscular energy and do little work, and *vice versa*.

On one occasion we had a novel piece of work to get done, and took it to several shops, where its accomplishment was unsuccessfully essayed. After much trouble and expense we met a German friend, who being informed of our predicament, recommended us to a shop where he assured us we could get our work performed satisfactorily.

Being rendered somewhat skeptical by our previous experiences, we made some inquiries about the facilities of the shop recommended, and were told by our Teutonic adviser, that it possessed a tool not to be found in any of the shops previously tried, by which all sorts of difficult work impossible to the others could be quickly and excellently executed. We were curious to see this remarkable machinists' tool, which our imagination pictured as quite out of the usual run of lathes, planers, and common paraphernalia of the machine shop, but were at once informed that it would not be shown.

We sent our order to this shop by the hands of our adviser, and duly received it, just the thing we wanted. It was so satisfactory, that seeing the same gentleman a few days after, we pressed him for some description of the machine by which such a marvel of delicate and accurate work could be performed. He avowed that he could not describe it but he could give us its name. "Well what *is* the name?" cried, we.—"Brains" was the laconic reply.

Ah! what, not essentially impossible, can not be done with this great tool which the Almighty has bestowed upon man. But to use it skillfully requires practice. The commonest cause of failure is not want of natural mental ability but want of training; training that might have been attained through personal effort had its value been known. In fact all training, whether of brain or muscle, must be attained by personal exertion. The most that teachers can do is to direct, and give the best methods in which the process may proceed.

We are of those who believe the kind of training should be adapted to the intended life-occupation of the student. To the mechanic, or to any man whose occupation is connected more or less with constructive mechanics, inventive ability is of the first consequence. Not that by its exercise all will be enabled to make great improvements upon existing methods, or to strike out entirely new and original devices; but that all will, by its aid, be rendered more efficient mechanics, farmers, manufacturers, or chemists, as the case may be.

The farmer grubbing up the big stump in yonder field, is engineering on a small scale. The next stump he essays can not be got out in precisely the same way. He must modify his plan somewhat. He must *invent* a way to do it. Whether it will be the best way or the worst way, will depend upon the degree to which his inventive talent has been trained or neglected. He may break his chains and kill his team, or by skillful management uproot the unsightly stub which cumbers the ground.

This training may be constantly going on during the ordinary avocations of life. Every mechanic should feel that it is not enough to simply do a thing; it should be done in the best way possible. Studying how to do things is the best and surest way to get proper mental training. Where living teachers can not be obtained books may be. The nineteenth century in free America offers no excuse for ignorance.

THE SPIRIT OF THE AGE.

Certainly those papers which have assumed to condemn the establishment of a chair of positive philosophy at Harvard, and the publication of lectures of Professor John Fiske, the able expounder of "positivism" in that institution, by the New York *World*, have greatly mistaken the spirit of the age.

The thinkers of the period are struggling by every possible means to arrive at truth. They have disembarrassed themselves of all superstitious reverence for old doctrines and old beliefs, and have entered into their work with the determination to recognize nothing as true merely because it has long been accepted as such. They are obeying the injunction of St. Paul: "Prove all things."

The clamor of bigots against free thought and free discussion avails no more to stem the current of thought, than the howling of the wind below Niagara to stay the mighty cataract. If some—if all the men who are molding the thought of the age, are wrong in their conclusions, the prohibition of discussion in our public institutions is the very best way to perpetuate their errors. It has been in all ages by prohibiting discussion that falsehood and quackery have flourished. And no essentially false theory can ultimately outlast the scrutiny which is brought to bear upon it by free discussion.

Therefore, if positivism is a false philosophy, it has been brought to execution in its introduction to the thought which pervades our universities, and its enemies should ask no greater advantage than is given through its public exposition by one of its acknowledged champions, in the columns of a widely circulated journal. It thus offers itself to general attack, and its defeat is morally certain if it has not truth for its basis. Those who refuse to confront it are moral cowards, who do so only in the fear that their favorite creeds will suffer in the conflict.

PROGRESS OF LABOR.

In the reign of Henry VIII., artificers and laborers were compelled to eat horse-corn, beans, peas, oats, tares, and lentils. They slept on coarse straw covered with canvas, and lived in straw-thatched hovels of mud and wood, with the bare earth for a floor. They ate their food from wooden trenchers, and their clothing was of the coarsest possible materials. The laborer of to-day lives in what would have been considered a palace at the time of which we speak. He eats food which would have been deemed fit for a lord of Henry VIII.'s court, and commands furniture, clothing, books, and other mental and physical wealth which that monarch's kingdom could not have purchased.

In the three centuries which have since elapsed, labor has been constantly progressing more rapidly than capital, until at the present time the supremacy of the latter has become extremely doubtful, and many of the most careful thinkers of the age prophesy the speedy arrival of the day, when the present wages system must be abandoned for a co-operative system, in which labor shall enter into partnership with capital, and share profits according to its productive value.

THE STEAM ENGINE INDICATOR.

We are in receipt from the publisher, D. Van Nostrand, Nos. 23 Murray street and 27 Warren street, New York city, of a copy of a work on the steam engine indicator; being the treatise of Charles T. Porter, revised and adapted to American practice, by F. W. Bacon, M. E., Member of the American Society of Civil Engineers, with an appendix containing useful formulas and rules for engineers.

Were we called upon to prescribe the best method whereby a student could gain, not only the most easy but the most thorough theoretical knowledge of the laws which govern the formation and expansion of steam and the application of steam to the performance of work in engines, we should unhesitatingly recommend a course of study with the indicator. The indications of this beautiful instrument not only tell what is going on in the cylinder of an engine, but in doing this they lead the mind to the consideration of the fundamental principles of steam generation, as well as the doctrines of expansive force, latent heat, temperature, laws of condensation and radiation, and the subtile relations which all the phenomena of steam bear to each other.

Mr. Bacon has, in his revision of Mr. Porter's work, done the American engineering public a great service, and has supplied a valuable hand-book of reference and instruction. Mr. Porter's treatise has been for some time out of print, and the present revision has offered a good opportunity for the addition of much valuable matter, and the adaptation of the work to American practice.

The work commences with a full description of the indicator and the mode of applying it, and we are glad to see that Mr. Bacon has in this department been profuse in practical details which are apt to embarrass a novice. Next follows a discussion of the interpretation of indications, given in a plain and concise style, and perfectly comprehensible to men of ordinary intelligence. This part of the work contains a number of tables, by the use of which much of the labor in reducing indicator cards is avoided.

Mr. Bacon's method of determining where the true theoretic curve on a card intersects the ordinates is very clear, and will greatly assist beginners; the numerators of the fractions being constantly the number of the ordinate where the steam is cut off, and the denominator the number of the ordinate, the length of which is sought. This is well illustrated by a special diagram.

A great variety of diagrams is given. A careful study of these diagrams cannot fail to interest all who desire to understand the working of the indicator.

We herewith produce two of them, one of which was taken from an English locomotive engine, and the other from an American locomotive.

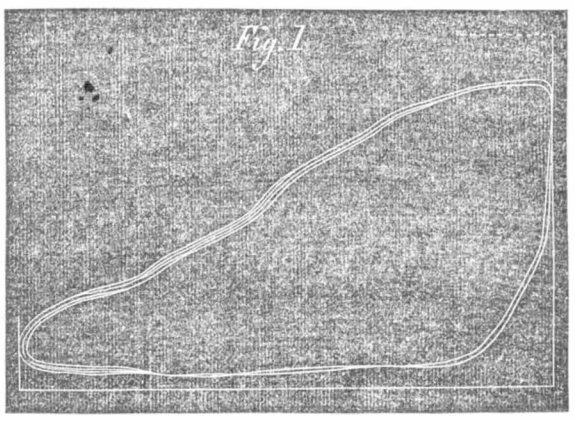

Fig. 1 is the English card, taken from the locomotive "Eagle," on the London and Southwestern Railway, in April, 1863. This diagram, with three others given by the author, are fair samples of a large number taken from the same locomotive.

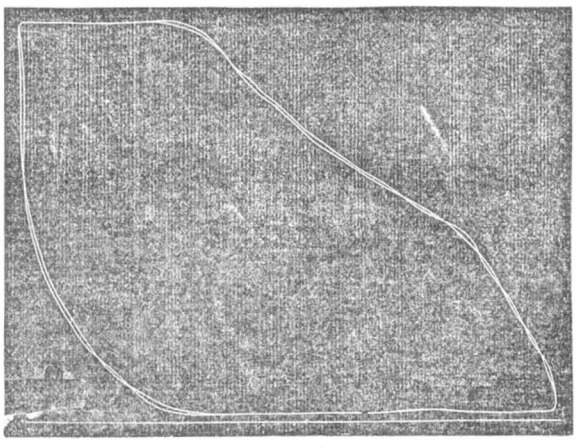

Fig. 2 is a diagram of a card taken from locomotive No. 50 on the Philadelphia, Wilmington, and Baltimore Railroad, in 1867. It was taken at sixty miles per hour, the piston making 1,222 feet per minute, with 305·46 revolutions.

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In regard to this diagram, the author remarks: "Notwithstanding this extraordinary speed the lines are all well defined showing distinctly the points of cut-off and release. A remarkable point in the diagram is, that though the pencil passed over it certainly twice or more, the lines are very near to each other, showing that even under this unprecedented speed of piston, the instrument was uniform and reliable in its action. This is not a selected diagram, all others taken on the same trip show the same characteristics.

Leaving the interpretation of these diagrams to engineers, we pass to the appendix, which contains much useful information.

We shall also make a single extract from this portion of the work, which will sufficiently show its practical character. The extract relates to the measuring of steam used for heating.

"The engineer is often called to determine the amount of steam that is used to heat apartments, liquids, etc. This the indicator does not reveal directly, no further than it shows how much steam it requires for a horse power; varied, of course, by the point of cut-off and its efficiency.

"Under these circumstances we have followed the rule of Watt, which is to allow one cubic foot of water per hour for each horse power; hence we measure the water condensed in the heating pipes in a given time, and estimate accordlying·

"If it is inconvenient to reduce the water to cubic feet, it may be weighed, allowing 62·5 lbs. to the cubic foot, or it may be measured by the gallon, or 7·48 gallons per cubic foot.

"When the steam pipe enters the vessel, and it discharges the steam directly into the liquid to be heated, the water then cannot be caught to be measured; in that case we measure the increment of its contents, and thereby find the quantity of steam condensed."

On the whole, the work is one well adapted to the use of scientific and practical engineers, and cannot fail to be an important help to any who seek a complete knowledge of steam and its applications.

TO KEEP CELLARS FROM FREEZING.

An agricultural friend, at our suggestion, has tried an experiment with a cellar of an out-house, in which on several occasions vegetables have frozen, although the cellar was fortified against frost by a process known to farmers as "banking." The walls and the ceiling were pasted over with four or five thicknesses of old newspapers, a curtain of the same material being also pasted over the small low windows at the top of the cellar. The papers were pasted to the bare joists overhead, leaving an air space between them and the floor. He reports that the papers carried his roots through last winter, though the cellar was left unbanked, and he is confident they have made the cellar frost-proof.

We do not counsel the special use of old newspapers for this purpose. It is just as well or better to use coarse brown paper. Whatever paper is employed, it will be necessary to sweep down the walls thoroughly, and to use a very strong size to hold the paper to the stones. It is not necessary to press the paper down into all the depressions of the wall; every air space beneath it is an additional defense against the cold.

ANNOUNCEMENT FOR 1870.---A SPLENDID WORK OF ART AND CASH PREMIUMS TO BE GIVEN.

The SCIENTIFIC AMERICAN enters its twenty-fifth year on the first of January next, and to mark this period of a quarter of a century in which it has maintained its position as the leading journal of popular science in the world, we have purchased from the executors of the estate of the late John Skirving, Esq., and propose to issue on New Year's day, the fine steel engraving executed by John Sartain, of Philadelphia, entitled

"MEN OF PROGRESS—AMERICAN INVENTORS."

The plate is 22x36 inches, and contains the following group of illustrious inventors, namely, Prof. Morse, Prof. Henry, Thomas Blanchard, Dr. Nott, Isaiah Jennings, Charles Goodyear, J. Saxton, Dr. W. T. Morton, Erastus Bigelow, Henry Burden, Capt. John Ericsson, Elias Howe, Jr., Col. Samuel Colt, Col. R. M. Hoe, Peter Cooper, Jordan L. Mott, C. H. McCormick, James Bogardus, Frederick E. Sickles.

The likenesses are all excellent, and Mr. Sartain, who stands at the head of our American engravers on steel, in a letter addressed to us says "that it would cost $4,000 to engrave the plate now," which is a sufficient guarantee of the very high character of the engraving as a work of art.

The picture was engraved in 1868, but owing to the death of Mr. Skirving, a few copies only were printed for subscribers at $10 each. A work embracing so much merit and permanent interest to American inventors, and lovers of art, deserves to be much more widely known. We propose, therefore, to issue, on heavy paper, a limited number of copies at the original price of $10 each, to be delivered free of expense. No single picture will be sold for less than that price, but to any one desiring to subscribe for the SCIENTIFIC AMERICAN, the paper will be sent for one year, together with a copy of the engraving, upon receipt of $10. The picture will also be offered as a premium for clubs of subscribers as follows to those who do not compete for cash prizes·

For 10	names	one	year	$30	one picture.
" 20	"	"	"	50	" "
" 30	"	"	"	75	two pictures.
" 40	"	"	"	100	three "
" 50	"	"	"	125	four "

In addition to the above premiums we also offer the following cash prizes:

$300	for the	largest	list of	subscribers
250	" "	second	do	do
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150	" "	fourth	do	do
100	" "	fifth	do	do
90	" "	sixth	do	do
80	" "	seventh	do	do
70	" "	eighth	do	do
60	" "	ninth	do	do
50	" "	tenth	do	do
40	" "	eleventh	do	do
35	" "	twelfth	do	do
30	" "	thirteenth	do	do
25	" "	fourteenth	do	do
20	" "	fifteenth	do	do

Subscriptions sent in competition for the cash premiums must be received at our office on or before the 10th of February next. Names can be sent from any post office, and subscriptions will be entered from time to time until the above date. Persons competing for the prizes should be particular to mark their letters "Prize List" to enable us easily to distinguish them from others.

Printed prospectuses and blanks for names furnished on application.

NEW PUBLICATIONS.

A MANUAL OF THE HAND LATHE. Comprising Concise Directions for Working Metals of all kinds, Ivory, Bone, and Precious Woods; Dyeing, Coloring, and French Polishing, Inlaying by Veneers, and various Methods Practiced to Produce Elaborate Work with dispatch and at a small expense. By Egbert P. Watson, Late of the SCIENTIFIC AMERICAN, Author of "The Modern Practice of Machinists and Engineers." Illustrated by Seventy-eight Engravings. Philadelphia: Henry Carey Baird, Industrial Publisher, 406 Walnut street. London: Sampson, Low, Son & Marston, Crown Buildings, 188 Fleet street. Price $1·50.

This work is eminently practical, and the information given is based upon the experience of the author. A brief extract from the work on the "Gluing in of Veneers," published in another column, will give a good idea of the plain and practical character of the book, and when we add that the subjects enumerated in the title above set forth are treated in the same clear and practical manner, we have said enough to convince the common-sense mechanic of the value of the work.

THE CHEMICAL FORCES—HEAT, LIGHT, ELECTRICITY. With their Applications to the Expansion, Liquefaction, and Vaporization of Solids; the Steam Engine, Photography, Spectrum Analysis, the Galvanic Battery, Electro-Plating, the Electrical Illumination of Light-Houses, the Fire Alarm of Cities, the Atlantic Telegraph, an Introduction to Chemical Physics. Designed for the Use of Academies, Colleges, and Medical Schools. Illustrated with numerous Engravings, and containing Copious Lists of Experiments, with Directions for Preparing them. By Thomas Ruggles Pynchon, M. A., Scovill Professor of Chemistry and the Natural Sciences, Trinity College, Hartford, Conn. Published by O. D. Case & Co.

A scientific book adapted to the student as well as the general reader is difficult to prepare. The author of this work has, however, shown himself skillful in meeting the difficulties of his task, though we think he displays something too much of caution in his discussion of modern views of the nature of molecular forces. In fact he can hardly be said to discuss them, contenting himself with their enunciation merely. In a work of this kind it would have been more satisfactory to have seen some more space given to this important subject. The correlation, convertibility, and equivalency of the physical forces are, however, well discussed. As the title promises, the industrial application of the chemical forces are noticed at considerable length, and it has been the aim of the author to produce a book not requiring of its reader an extensive knowledge of mathematics; it is well adapted to the use of the general reader. We notice that points liable to give difficulty to those not familiar with the subject are treated with special care, and are elucidated as only a teacher who has been accustomed to show pupils the way out of such difficulties could elucidate them. This is a valuable feature of the work, and one which will be appreciated by Mr. Pynchon's readers. We recommend the work as one of the best text-books we have met with upon the subject of which it treats.

STUDIER I GRUFBRYTNINGSVETENSKAP No. 2. UEBER GESTEINSBOHRMASCHINEN. Von Dr. phil. F. M. Stapff, Ascultant in der Bergabtheilung des Commercecollegiums. Mit Atlas enthaltend 11 theils Lithografirte theils ueberdrueckte Tafeln. Stockholm: A. Bonnier, 1869. [A TREATISE ON ROCK-DRILLING MACHINERY. By F. M. Stapff, *Ascultant* in the Mining Department of the Royal Commercial College. With an Atlas containing 11 sheets of Lithograph Plates. Stockholm: A. Bonnier, Publisher, 1869.]

This is a very copious and comprehensive treatise in the German language on rock drilling and cutting, with especial reference to mining, tunneling, etc., etc. The methods employed in the most celebrated works of this character are described, and the machinery discussed and illustrated in detail. The atlas sheets are large folio, each containing a large number of finely-executed drawings. The work is one admirably adapted to the use of engineers, and well merits an English translation.

THE AMERICAN BUILDER. Published by Charles D. Lakey, Chicago, Ill. Terms, $3·00 per annum.

The above is one of our most interesting exchanges, and we are please to learn that it is meeting with well deserved success.

Caveats are desirable if an inventor is not fully prepared to apply for his patent. A Caveat affords protection for one year against the issue of a patent to another for the same invention. Patent fee on filing a Caveat, $10. Agency charge for preparing and filing the documents from $10 to $12. Address MUNN & CO., 37 Park Row, New York.

Inventions Examined at the Patent Office.---Inventors can have a careful search made at the Patent Office into the novelty of their inventions, and receive a report in writing as to the probable success of an application. Send sketch and description by mail, inclosing fee of $5. Address MUNN & CO., 37 Park Row, New York.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The losses by fire in the United States, from last January to October, inclusive, amount to the large sum of $33,554,000.

M. Delaurier states that oxygen may be obtained very economically from manganate of lime, as this salt when heated gives off that gas very abundantly.

A surveying party of the San Diego, El Paso, and Memphis Railroad have passed the summit of the range of mountains between San Diego and Fort Yuma. They report the grade to be less than 100 feet per mile.

A writer in *Comptes Rendus* says that if articles made of copper be immersed in molten sulphur having lamp-black in suspension, they assume the appearance of bronze, and can be polished without losing that aspect.

It is stated that Mr. A. T. Stewart has purchased the block lying between North Twelfth and North Thirteenth streets, and First street and the East river, Brooklyn, for $200,000, and that he intends to build thereon a depot for the proposed railway to Hempstead.

Water collected from roofs or kept in tanks covered with zinc has been found by M. Zuirck to be so much contaminated by that metal as to prove detrimental to health, when used for domestic or industrial purposes. He recommends that such tanks or roofs be painted with asphalte varnish.

Chicago is going into the iron manufacture on a large scale, and with Lake Superior ores. A number of capitalists there have formed a company and contemplate the erection of a large mill at Joliet. Wrought iron gas and water pipes will form one feature in the production of the establishment.

The miners of the Wilkesbarre (Pennsylvania) Coal and Iron Company have a fund of five thousand dollars for the use of those of their number who may be disabled in any way. It was raised by each miner and the company giving the earnings of one day; one thousand dollars is to go to Avondale, and the balance in the above manner.

The Darien canal project is reviving. The United States steamer Nipsic, attached to the South Atlantic squadron, is under orders to proceed to the Isthmus of Darien to make surveys and explorations, with a view to determine the best location for an inter-oceanic canal. A similar survey on the Pacific shore of the Isthmus will be made at a future day. It is asserted that President Grant will recommend the early construction of this Darien ship canal in his forthcoming message. What truth there may be in the statement it is difficult to say, as never before has a president been so successful in preventing a premature publication of the contents of the annual communication to Congress.

M. Méne says that when woods of a naturally white color are painted over with a concentrated aqueous solution of permanganate of potassa, they assume the appearance of walnut wood. Different woods behave in a different manner when acted upon by this solution. The woods of the pear tree and the cherry tree are readily stained, while the white woods (the acacia, for example) resist a longer time, and resinous woods, as the fir, are still more difficult to affect. The *rationale* is that the permanganate of potassa is decomposed by the woody fibers; brown peroxide is precipitated and fixed by the potassa, which is afterwards removed by washing with water. The wood when dry is varnished, and is not easily distinguished from woods of a naturally dark color.

Correspondents of the *Chemical News* give two methods of constructing foot-paths: (1.) One part of Portland cement mixed with seven or eight parts of gravel, or old, hard rubbish, such as brick-bats, broken stones, etc., will make a neat, cheap, permanent garden walk, impervious to wet, and not readily affected by changes in the weather. (2.) A very good, and comparatively cheap foot-path may be made by laying down, first, a layer of coarsely broken-up old bricks, next, some middling coarse gravel, and over that a layer, from two to four inches in thickness, of small sea-shells. If care be taken to beat or roll the broken-up bricks and gravel into a somewhat solid mass, the shell-covered surface may be advantageously rolled in with a heavy iron roller, and will form even on soft sub-soil, a durable and inexpensive roadway.

GROOVED WHEEL RAILROAD BRAKE.—A novelty in railroad brakes, which seems to us to possess much merit, is the subject of a recent patent granted to R. d'Heureuse, whose address is Box 6,544, New York. Grooved wheels are employed between the running wheels of the truck, raised just enough to clear the rails, when it is desired that the speed be unimpeded; but when the motion is to be arrested or retarded, the grooved wheels are depressed upon the rails and the brake blocks forced down into the grooves, thus quickly effecting the purpose. This system of brake is operated by either hand or steam power, and with but a small expenditure of force. A model exhibited at the late American Institute Fair, worked well, and seemed to be a step in the direction of improvement. As the grooved wheels are arranged in the middle of the truck, the weight of the car would be sustained by them, in the event of an ordinary running wheel or its axle being broken, and many of the accidents so frequently occurring would thus be prevented.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

IMPERMEABLE PAPER COLLARS, CUFFS, ETC.—It is proposed to make these of paper which has been partially converted into vegetable parchment. It is well known that water has little or no effect on paper so prepared, and colors and patterns can be applied with the greatest facility.

PRESERVING ANIMAL AND VEGETABLE SUBSTANCES, ETC.—Mr. G. W. Perry, of Melbourne, Australia, treats the substances to be preserved as follows. They are first washed in a solution of bisulphite of lime and magnesia, and then dipped into a boiling solution of gelatin and bisulphite, and so, when dry, the substance is coated with an air-tight covering. In order to preserve animals, without removing the skin or feathers, a hot solution of bisulphite of lime and magnesia, with the addition of ten per cent of common salt must be injected into the blood vessels as soon as the blood is drained from the body, and before the carcase has become set. The viscera may then be removed, and the inside thoroughly cleansed and washed with the bisulphite solution. Fish, to be preserved, should be cleansed, the viscera removed, and then packed in barrels, filled with a pickle composed of salt and bisulphite solution. Liquids, too, such as ale and wine, or other fermented liquors, it is said, can be preserved in vessels, the inside of which have been washed with bisulphite of lime and magnesia.

MANUFACTURE OF SULPHURIC ACID.—This invention consists in the employment of ammonia, or carbonate of ammonia, to condense the nitric acid vapors escaping from the exit of the vitriol chambers. To accomplish this, ammonia, or carbonate of ammonia, is caused to come in contact with the escaping fumes, either in a cone tower or chamber. The fluid, thus resulting, is again afterwards decomposed with sulphuric acid, and the escaping nitrous fumes are returned into the vitriol chamber for the oxidation of the sulphurous acid. The patentee of this invention is Mr. Konrad Walter, Wicklow, Ireland.

MACHINERY FOR MANUFACTURING SEMOLINA AND FLOUR.—G. A. Buchholz, Shepherd's Bush, England.—The invention relates to a novel arrangement of apparatus for reducing hulled wheat to semolina, which apparatus by slight modifications, may be used to reduce the same to flour, the object being to effect such operations rapidly, and, when designing to manufacture semolina, to produce it with concurrent formation of a minimum proportion of flour or wheat dust. It is also designed to economize space in the mill by rendering the apparatus more compact than heretofore.

GRINDING MILL.—G. A. Buchholz, Shepherd's Bush, England.—This invention consists in the use of pairs of grooved rollers which are nicely adjusted to their work, and are speeded so that one roller will rotate from five to six times as fast as the other roller, and thereby reduce by a cutting in contradistinction to a crushing action, the cripped corn into particles of the required size.

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TREATING CORN FOR PANIFICATION.—By this process corn is prepared for bread-making without grinding, and it is asserted, that by it, all the nutritious portions of the grain are retained, and only the outer pellicle is removed. The corn is first steeped in water to remove dust and foreign matter; in this way defective grains can be removed, as they will be found floating on the surface. After steeping for half an hour, the water is to be run off, and the grain is introduced into a metal cylinder with rasp-like projections on its inner side, which remove the outer pellicle. The grain is then placed in a receptacle filled with water, at 68° Fah., about 400 lbs. of water being employed to about 200 lbs. of grain, so that there may be a certain quantity of water above the grain, about 2 lbs. of semi-dried yeast, and from ·15 lb. to ·2 lb. of glucose having been previously mixed with the water, this fermentable matter acts by degrees upon the grain, which, after about twenty or twenty-four hours immersion, is ready for fermentation as bread, having absorbed from fifty to seventy per cent of water. The water is then drawn off, and the grain is placed in a hopper, which, by means of a distributor, causes it to pass between rollers, where it is reduced to a pasty condition. The pasty mass is then mixed with water, to which the requisite amount of salt has been added, and the dough is then made up into loaves and baked.

A NEW SWEETMEAT.—It is often amusing to notice the very simple and ordinary matters which are sometimes made the subject of a patent, the following is one of them. M. François Arond, of Lyons, France, has provisionally patented a method of manufacturing a *veritable* sweetmeat. He mixes seven ounces of sugar, one ounce of marmalade, eleven drams of rum or other spirit, eleven drams of extract of *meat*. After thorough incorporation, the sweetmeats are molded, dried, and finally candied.

BLIND MORTISING MACHINE.—Martin Buck, Lebanon, N. H.—This invention consists in arranging the levers which move the slides carrying the stiles to be bored and mortised, to or from the boring or mortising tools, for adjustment, so that the said slides may have a greater or less movement as required by the nature of the work. It also consists in an arrangement of interchangeable ratchet bars with ratchet teeth of different pitch, for varying the movement of the stiles past the cutter for different kinds of work. It also consists in an adjustable arrangement of the reciprocating boring and mortising tool carrying carriage for varying the angle of the slots.

MODE OF PACKING EGGS, FRUIT, ETC.—A. S. Smith, Lawrence, Mass.—The invention consists in the employment of pockets made in pairs of strips of stiff paper, leather, or bark, folded, and joined in a way to make two pockets of one strip and by one fastening, and of the proper size to receive one article each, the said pockets being open at each end, and arranged in tiers in a box, barrel, or case, with dividing boards between each tier, constituting the end walls of the said pockets when in position.

WASH BOILER.—G. E. Calkins, Rock Island, Ill.—This invention relates to improvements in wash boilers such as are arranged to cause a circulation of hot water and steam from the bottom upward through pipes or passages, and has for its object to provide an improved construction and arrangement of the false bottom or rack, whereon the clothes rest for keeping them above the bottom, to provide space for generating the steam.

BLACKING BOXES.—C. H. Gatchell, Oldtown, Maine.—This invention relates to improvements in blacking boxes, and consists in providing pointed tacks projecting downward from the bottom for holding the box from being moved around on the table or other board whereon it sets, when rubbing the brush on the blacking to charge it for applying to the shoe.

WELDING, TEMPERING, TOUGHENING, AND PURIFYING IRON AND STEEL.—J. F. Beazel, Uniontown, Pa.—This invention relates to improvements in welding, tempering, toughening, and purifying iron and steel, and consists in working the same in the presence of a flux of caustic soda, known in commerce as "saponifier," or "concentrated lye."

STUMP EXTRACTOR.—Alexander McLeod, Black River Falls, Wis.—The object of this invention is to furnish a simple, convenient, powerful, and effective machine for extracting stumps from the ground, and it consists in a combination and arrangement of mechanical appliances by means of which the object in view is attained.

MACHINE FOR MAKING WOOD PULP.—Frederick Burghardt, Curtisville, Mass.—This invention relates to a new and useful improvement in machines for reducing wood to pulp for use in manufacturing paper, and consists in a wheel with one or both of its sides provided with grating, rasping, filing, or roughened surfaces, in contact with which the wood to be reduced is brought.

KNIFE SHARPENER.—W. H. Howland, San Francisco, Cal.—This invention relates to a new and useful improvement in an article for sharpening knives, whereby that necessary operation is greatly facilitated, and it consists in the employment of two conical disks, composed of emery or of some equivalent grinding composition or material, secured together in a suitable stand or support by means of a screw or bolt.

BEEHIVE.—W. A. Elam, Milan, Tenn.—This invention relates to new and useful improvements in beehives, whereby they are rendered more useful than they have hitherto been, and consists in the construction and arrangement of parts.

WAGON SEAT SPRING.—Cyrus C. Carter, Exeter, Ill.—This invention relates to a new and useful improvement in seats for lumber and other wagons, and consists in the novel arrangement of adjustable springs.

HARROW.—John H. Miller and F. A. Pickering, Niantic, Ill.—This invention relates to new and useful improvements in harrows, whereby the parts which carry the harrow teeth are made adjustable, so that obstructions may be avoided and so that the harrow will adjust itself to the surface of the ground over which it passes.

COMBINED PLATE LIFTER AND BREAD TOASTER.—T. D. Keith, Mayville, Wis.—This invention relates to a new and useful improvement in an article for kitchen use, designed for lifting plates and toasting slices of bread, and it consists in the use of a slide on two or more long hooks secured to a handle.

BABY WALKER.—John C. Goulding, Trenton, N.J.—This invention has for its object to so construct baby walkers that it will fit the child like a garment, allow the same freedom of motion while supporting it, and be simple, light, and cheap at the same time.

STAIR ROD FASTENER.—Josef Stuehler, Brooklyn, N.Y.—This invention relates to a new stair rod fastener, which is so constructed that the rod can be readily applied and removed, and securely retained in proper position.

GANG SAW MILL.—William Penny, Milton, Fla.—This invention relates to a new manner of constructing and arranging the frames of gang saw mills, with a view of producing a simple, effective, and compact machinery which may be readily transported, and which will combine all the requisites of a full working mill.

BASKET.—C. Renne and F. Landenberger, New York city.—The object of this invention is to construct a basket so that it will indicate the weight of the articles contained in it, to enable housekeepers and other parties buying goods to judge whether the correct weight has been measured out to them.

ANIMAL TRAP.—Robert Tompkins, Clarksville, Tenn.—This invention consists of a cylinder of wire netting, mounted upon trunnions so as to easily revolve, having a hole at one end for the entrance of the victim, and, near the other, the hook holding the bait. The weight of the animal, as soon as he enters the cylinder, causes the latter to rotate until such rotation is checked by a stop at a point where an egress is afforded from the cylinder into a retaining box, immediately upon which egress of the animal, the cylinder, relieved of its weight, rotates back to its original position and is reset.

BILLIARD-TABLE CUSHIONS.—Mathew Delany, Virginia City, Nevada.—This invention relates to improvements in billiard-table cushions, and consists in the combination with the india-rubber cushions, of wires or cords embedded in the edges, running from end to end thereof, and strained by straining keys, or other devices, in a way as to impart a superior springing quality to the said cushions.

HULLING MACHINE.—G. A. Buchholz, Shepherd's Bush, England.—This invention consists of a cylindrical case fitted at its opposite sides with panels of wire gauze or pierced metal to facilitate ventilation within, and armed on its inner peripheries at the parts not occupied by the panels with sets of steel blades fixed radially in segmental groups; within the cylindrical case is mounted a series of drums, say four, the number preferred for ordinary working, which are keyed upon a central rotating shaft; these drums are armed on their peripheries, with blades made like those on the case of flat steel plates. The drums are cast with radial wings, extending from the boss to the periphery, and holes are formed through the drums to allow of a down draft being created and distributed through the case by the wings as the drums are rotated. The drums instead of being inclosed, as heretofore, in separate cylindrical chambers have interposed between them horizontal rebated ring plates, which form part of the case. These ring plates and also the bottom plate of the case are cast with annular-flanged projections, which are intended to receive steel blades rebated at the back to fit the flanged projections.

PHOTOSCOPE.—George Brownlee, Princeton, Ind.—This invention relates to a new apparatus for displaying successively any suitable number of photographic or other pictures. The object of the invention is to construct a case, not much larger than necessary to hold the pictures, and without any machinery, and still to allow all pictures to be displayed in the required succession by the motion of the case.

APPARATUS FOR TEMPERING STEEL.—C. B. Cottrell, Westerly, R. I.—This invention relates to a new apparatus for conveniently and rapidly tempering small tools or other articles made of steel.

KEY AND KNOB SHANK GUARDS.—Max E. Berolzheimer, New York city.—This invention consists of a sliding guard having a notch or slot in the end for sliding over the plain sided shanks of the keys or knobs so as to hold them in the manner of a wrench, to prevent them from being turned; the said slides may be provided also with pins for passing through holes in the shanks, or they may hold the same wholly by the pins if preferred. They are also provided with caps fastened to the lock plate or door for the reception of the ends, to confine them against efforts which may be made from without to force them away from the door by strong rods inserted in the keyholes and forced against them. They may also be provided with any preferred means to hold them from sliding back, to disengage the shanks, and when applied to the keys they are made broad enough to cover the whole of the keyhole.

A NEW RAILWAY BRAKE has been invented in England which acts automatically when the connections between the parts of a train are any of them ruptured to bring both portions of the train to a stand-still. The details of its construction are not given in the papers which announce the invention except that the brakes are thrown into operation by the rupture of a small chain which passes under the train from end to end.

LATHE ATTACHMENT FOR TURNING OVALS.—Ramsey Lawson, Shelburne Falls, Mass.—This invention has for its object to furnish an improved device for attachment to lathes, by means of which oval handles for tools, and other oval work may be turned with the same ease and rapidity as round work.

COMBINED PLANTER AND CULTIVATOR.—John A. Rockwood, Kinderhook, Ill.—This invention has for its object to furnish a simple, convenient, strong, durable, effective, and cheap machine, which shall be so constructed and arranged that it may be easily and quickly adjusted for use as a planter or cultivator, as may be required.

TURBINE WATER WHEEL.—A. M. Harding, Oregon City, Oregon.—This invention has for its object to furnish an improved water wheel, which shall be simple in construction and effective in use, being so constructed and arranged as to economize the water and enable its admission to be more conveniently regulated and controlled.

CULTIVATOR.—S. W. Brock, Niantic, Ill.—This invention has for its object to furnish an improved cultivator, which shall be simple in construction, effective in operation, and easily adjusted to work closer to or farther from the planets and to turn the soil towards or from the plants, as may be desired.

HAND CORN SHELLER.—Charles M. O'Hara, Bolivar, Tenn.—This invention has for its object to furnish a simple, convenient, and effective device, by means of which the corn may be shelled quickly and easily, and which shall be particularly adapted for shelling corn for seed or meal, where only part of the kernels are to be removed from the cob.

COMBINED SCOOP AND SIFTER.—Cephus Boucus, Waupun, Wis.—This invention has for its object to furnish a simple and convenient instrument, by means of which flour, and other substances, may be lifted and at once sifted without its being necessary to handle them two or three times before getting them sifted and into the place or vessel where they are to be used.

CULTIVATOR.—I. N. Gates, Burnside, Ill.—This invention has for its object to furnish an improved device for connecting the plow beams to the truck frame of a cultivator, which shall be simple in construction, strong and durable, and effective in operation, permitting a free vertical and lateral movement of the plows, and at the same time holding the plow beams loosely and steadily, preventing all tendency of the plow to wallow or tip when plowing crooked rows.

COMBINED BED AND KEY BOARD MUSICAL INSTRUMENT.—John McDonald, New York city.—This invention has for its object to furnish a key-board musical instrument, which shall be so constructed that it may be opened up to serve as a bed, and which, when closed, shall have every appearance of, and may in fact be, a real instrument, suitable to be placed in a parlor or sitting room.

COMBINATION POCKET RULE.—This invention consists in a combination of twelve tools in one instrument, to be carried in the vest pocket and weighing less than one ounce. It is a pocket rule, ruler, square, bevel, screw driver, chisel, compasses, scissors, button-hole cutter, paper knife, eraser, and pencil sharpener. The instrument is finished in various styles—plain steel, silver, or gold plated. It is a most convenient and useful article. It will be found advertised on our last page by the Combination Tool Co., 95 Mercer street, N. Y.

BENDING MACHINE.—David Pierce, Almont, Mich.—This invention comprises an apparatus for first bending the edges of the strips of sheet metal for eavestroughs to receive the wire; also, an arrangement of apparatus for bending the sheet into the finished form and for wiring the edges; and also an apparatus for bending the sheets for the conductors, and for forming a part of the locks for uniting the edges.

BRIDGE.—H. W. Cass, Lodi, Wis.—This invention consists in an arrangement of counter chords at the center thereof, and braces between the ends of the said counter chords and the upper chord, whereby the upper and lower chords are braced by a series of inverted arch-shaped braces. The invention also comprises, in connection with the above, an arrangement of lateral brace rods.

GARDEN IMPLEMENT.—Henry Miller, Roadside, Va.—This invention consists in the manner of connecting the handle with stock, whereby the former is rendered removable, and, also, capable of being kept always tight.

CURRYCOMB.—J. E. Yager, Barboursville, Va.—The object of this invention is to construct a curry comb in such a manner, that, when it gets out of order from any cause, it can be readily taken apart and adjusted or repaired.

SHOVEL PLOW PLATE AND POINT.—Henry Miller, Roadside, Va.—This invention consists of a plow plate, or mold, to be secured to any plow stock, its face being concave, lengthwise, and flat crosswise, and the mold having seats at its ends into which are placed reversible points of shape suited to the seats.

FIREPLACE HEATER.—Benjamin F. Conley, Tunnelton, West Va.—This invention relates to improvements in hearths for fireplaces, and consists of a new and improved manufacture of hearths of cast metal, in place of ornamental designs, and of any size or shape for application to fireplaces of all dimensions or shapes.

HULLING MACHINE.—G. A. Buchholz, Shepherd's Bush, England.—This invention relates to the employment of improved machinery for manufacturing semolina. In carrying out this manufacture, the wheat intended to be converted into semolina is first hulled in a novel construction of apparatus, the acting surfaces of which are formed of metal blades which, when the apparatus is set in motion give to the grain the friction requisite for removing the outer skin or the greater portion thereof. When the grain has passed through this hulling machine, the bran or hull is separated therefrom in any approved manner, and afterwards the grain is submitted to the action of a novel construction of roller mill whereby a large portion will be reduced to semolina fit for the market. This is separated by sieves or other suitable means, and the remainder is reduced in any known or approved manner to flour which may be dressed and finished as usual for the market.

MACHINE FOR BORING AND TENONING.—Thos. Place, Alfred Center, N. Y.—This invention relates to improvements in machines for boring fellies and tenoning spokes, such as patented to the same inventor March 12, 1867, No 62,883, and consists in an improved arrangement of the turntable for holding and centering the hub on the carriage, for holding up to the auger and spoke holder.

BUCKLE.—Henry R. Swan, Norwalk, Conn.—The object of this invention is to confine the cloth, which supports the buckle, exactly in the center of the hook, so as to prevent its crowding to one side or the other when subjected to a lateral or oblique pull.

HOISTING MACHINE FOR RUNNING UP SLOPES.—Geo. Martz, Pottsville, Pa.—This invention relates to the propulsion of cars laden with coal from the gangway of a mine, up an inclined way, to the surface, by means of a motive truck, separate from the cars, and running upon a track above them.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4·00 a year.

For the best and cheapest scroll saw, address circular Post-office Box 303 Fort Plain, N. Y.

Blacksmiths and machinists send for circular of patent swage block, Lyman Kinsley & Co., Cambridgeport, Mass.

Patent pocket safety letter carrier. "A Neat Pocket Friend." By mail $1, postpaid. Address J. W. Burns, Medway, Clark county, Ohio.

Steel springs tempered. J. F. Dubber, 42 Hicks st., Brooklyn, N. Y., patentee of the self-closing pocketbook.

For Sale—The patent right of a "Combined Mat and Foot Scraper.' $800. "C. B.," New York Postoffice, Box 1904.

Send for the Acme Club Skate. See advertisement.

Boiler for Sale, 12 feet long, 3 feet dia., 30 3-in. tubes, with front grate bars, safety valve, steam gage, gage cocks, all complete, and in perfect order, at Foundery 333 E. 56th st., near 2d ave.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

H. Loftie, Syracuse, N. Y., wants a non-freezing hydrant.

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Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,685.—PUMP.—J. W. Douglas, Middletown, Conn. Sept. 14, 1869.

3,092.—SEWING MACHINE NEEDLES.—Mrs. H. G. Suplee, San Francisco, Cal October 25, 1869.

3,118.—MANUFACTURE OF SHEET IRON.—S. Parker and H. S. Pratt, Hartford, Conn. October 27, 1869.

3,125.—ELECTRO-DEPOSITION OF NICKEL.—Isaac Adams, Jr., Boston, Mass October 28, 1869.

3,133.—SHAFT COUPLING.—M. Clemens, Boston, Mass. October 28, 1869.

3,137.—SPRING.—J. Trent, Millerton, N. Y. October 29, 1869.

2,919.—AXLE BOXES.—D. H. Dotterer, Philadelphia, Pa. Oct. 8, 1869.

2,942.—MEANS OF LOCOMOTION.—Thomas Luders, Olney —, U. S. October 8, 1869.

3,067.—ROTARY BLOWING ENGINE.—P. H. Roots and F. M. Roots, Connersville, Ind. Oct. 21, 1869.

3,093.—DRY WHITE LEAD AND WHITE LEAD PIGMENT FROM METALLIC LEAD.—G. T. Lewis, Philadelphia, Pa. Oct. 25, 1869.

3,095.—ADHESIVE COMPOUND.—S. P. Conner, Philadelphia, Pa. October 25, 1869.

3,115.—WIRE DRAWING, ETC.—D. F. Maltby, Waterbury, Conn. Oct. 27 1869.

3,130.—AXLES FOR VEHICLES.—J. M. Requa, New York city. October 28, 1869.

3,131.—DRAWING FRAMES.—Chas. Wall, New York city. October 28, 1869.

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Issued by the United States Patent Office.

FOR THE WEEK ENDING NOV. 23, 1869.

Reported Officially for the Scientific American.

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97,021.—HORSESHOE MACHINE. — Wesley Anderson, Pittsburgh, Pa.

97,022.—MOUTH PIECE OF BRIDLE BITS.—A. P. Baldwin, Newark, N. J.

97,023.—WELDING IRON AND STEEL.—John F. Beazel, Uniontown, Pa.

97,024.—KEY GUARD.—M. E. Berolzheimer, New York city.

97,025.—SCOOP AND SIFTER FOR FLOUR, ETC.—Cephus Beucus, Waupun, Wis.

97,026.—MAGAZINE FOR BASE-BURNING STOVES.—B. C. Bibb, Baltimore, Md.

97,027.—FIREPLACE STOVE.—B. C. Bibb, Baltimore, Md.

97,028.—FIREPLACE STOVE.—B. C. Bibb and Philip Klotz, Baltimore, Md.

97,029.—FIREPLACE STOVE.—B. C. Bibb and Philip Klotz, Baltimore, Md.

97,030.—CHISEL-HOLDER FOR FILE-CUTTING MACHINES.—W. J. Birdsall, Newark, N. J.

97,031.—SLEEPING CAR.—H. S. Blood, Jefferson parish, La.

97,032.—CULTIVATOR.—S. W. Brock, Niantic, Ill.

97,033.—STENCH TRAP.—Jesse Brown, San Francisco, Cal.

97,034.—PICTURE CASE.—Geo. Brownlee, Princeton, Ind.

97,035.—DRAIN-PIPE MACHINE.—Isaac C. Bryant, Washington, D. C.

97,036.—MANUFACTURE OF SEMOLINA. — G. A. Buchholz, Shepherd's Bush, England. Patented in England Nov. 19, 1862.

97,037.—MANUFACTURE AND MEANS OF ASSORTING SEMOLINA AND FLOUR.—G. A. Buchholz, Shepherd's Bush, Eng. Patented in England March 28, 1867.

97,038.—MACHINERY FOR MANUFACTURING SEMOLINA AND FLOUR.—G. A. Buchholz, Shepherd's Bush, Eng. Patented in England Sept. 4, 1867.

97,039.—HULLING MACHINE. — G. A. Buchholz, Shepherd's Bush, Eng. Patented in England Aug. 12, 1868.

97,040.—BLIND-MORTISING MACHINE.—Martin Buck (assignor to himself and A. H. Cragin), Lebanon, N. H.

97,041.—MACHINE FOR MAKING WOOD PULP.—F. Burghardt, Curtisville, Mass. Antedated Nov. 15, 1869.

97,042.—WASH BOILER.—G. E. Calkins, Rock Island, Ill.

97,043.—WAGON-SEAT SPRING.—Cyrus C. Carter, Exeter, Ill.

97,044.—DRAWBRIDGE.—H. W. Cass, Lodi, Wis.

97,045.—COMPOUND FOR INSULATING.—A. H. Castle, Ann Arbor, Mich.

97,046.—MANUFACTURE OF CAST-METAL DIES.—Luke Chapman (assignor to Collins Co.), Collinsville, Conn.

97,047.—VEGETABLE CUTTER.—M. H. Chrysler, Kinderhook, N. Y. Antedated Nov. 18, 1869.

97,048.—STEAM COOKING APPARATUS.—James O. Clay, Hudson, Wis.

97,049.—COMBINED BUTTER CUTTER AND STAMP.—Nathan Clough, Lowell, Mass.

97,050.—FIREPLACE.—Benjamin F. Conley, Funnelton, West Virginia.

97,051.—MERCURIAL GAS REGULATOR FOR NITROUS OXIDE APPARATUS.—J. B. Coolidge, Boston, Mass.

97,052.—MERCURIAL REGULATOR FOR VULCANIZING AND OTHER HEATERS.—J. B. Coolidge, Boston, Mass.

97,053.—BUTTER MOLD AND PRINT.—Jas. S. Corya, Dupont, Ind.

97,054.—APPARATUS FOR TEMPERING STEEL.—C. B. Cottrell, Westerly, R. I.

97,055.—HIVE FOR RAISING QUEEN BEES. — Jewell Davis, Indianapolis, Ind.

97,056.—STEAM ENGINE GOVERNOR.—Rollin Defrees, Newark, N. J., assigns to J. D. Defrees, A. Defrees, and T. Percival three fourths of his right. Antedated Nov. 19, 1869.

97,057.—BILLIARD-TABLE CUSHION.—Mathew Delany, Virginia City, Nevada.

97,058.—PORTABLE STILL.—L. A. De Lime, St. Louis, Mo.

97,059.—APPARATUS FOR OBTAINING EXTRACTIVE MATTER FROM SUGAR CANE AND OTHER MATERIALS.—Louis A. De Lime, St. Louis, Mo.

97,060.—METHOD OF CONSTRUCTING ORNAMENTAL WOODWORK.—Joseph Dill and H. E. Jordan, Grand Rapids, Mich. Antedated Sept. 22, 1869.

97,061.—BAG FOR GATHERING FRUIT.—N. B. Dixon and M. W. Sprague, Rochester, N. Y., assignors to N. B. Dixon.

97,062.—HARVESTER CUTTER.—G. L. Du Laney, Mechanicsburg, Pa.

97,063.—CHAIR AND FAN.—Abraham Dyson, St. Louis, Mo.

97,064.—STEAM ENGINE VALVE GEAR.—T. Dyson and Geo. Smith, New York city. Antedated Nov. 19, 1869.

97,065.—WATER WHEEL.—A. A. Easton, Killingly, and A. J. Harrington, Plainfield, Conn.

97,066.—COOKING STOVE.—Richard Eaton, London, England, and Joseph Marks, Boston, Mass.

97,067.—BEEHIVE.—W. A. Elam, Milan, Tenn.

97,068.—EXCAVATING MACHINE.—William H. Elliott, New York city.

97,069.—LAMP BURNER.—J. B. Fuller, Norwich, Conn.

97,070.—GRAIN CONVEYER. — John Gardiner, Philadelphia, Pa.

97,071.—TICKET PUNCH.—John Gardner, San Francisco, Cal.

97,072.—BLACKING BOX.—C. H. Gatchell, Oldtown, Me.

97,073.—CULTIVATOR.—I. N. Gates, Burnside, Ill.

97,074.—HAND-GUIDE FOR PIANOS.—Marie Gether, St. Louis, Mo.

97,075.—COMBINED ROLLER AND ICE SKATE.—A. J. Gibson, Cincinnati, Ohio.

97,076.—DIAL TELEGRAPH APPARATUS.—E. T. Gilliland, Cincinnati, Ohio, assignor to himself and Peter Neff, Jr.

97,977.—DIGESTER FOR COFFEE POTS.—W. L. Gilroy, Philadelphia, Pa. Antedated Nov. 12, 1869.

97,078.—BABY WALKER.—John C. Goulding, Trenton, N. J.

97,079.—FIRE-PROOF SAFE.—John Pevear Greely (assignor to himself, Russell Arnold Ballou, Sanford Greely, and Jonathan Pierce), Boston, Mass.

97,080.—COAL DRILLING MACHINE.—John Grimm, Darlington township, Pa.

97,081.—CLIP OR PAPER HOLDER FOR PHOTOGRAPHERS.—V. M. Griswold, Peekskill, N. Y.

97,082.—PHOTOGRAPHERS' DRIPPING AND DRYING RACK.—V. M. Griswold, Peekskill, N. Y.

97,083.—COFFEE ROASTER.—T. J. Hall, Bryan, Texas.

97,084.—COOKING STOVE.—J. D. Harden, Troy, N. Y.

97,085.—TURBINE WATER WHEEL.—A. M. Harding, Oregon, City, Oregon.

97,086.—POST-HOLE DIGGER.—B. B. Herrick and C. W. Wicker, Duquoin, Ill.

97,087.—COMPOSITION FUEL.—Frank N. Hopkins, Baltimore, Md.

97,088.—CONGLOMERATE FOR PAVING, ROOFING, AND SIMILAR PURPOSES.—Frank N. Hopkins, Baltimore, Md.

97,089.—WHOOPING COUGH PLASTER.—Frederick Hower, Booklyn, N. Y,

97,090.—KNIFE SHARPENER.—W. H. Howland, San Francisco Cal.

97,091.—LUBRICATOR.—J. J. Hoyt, Chelmsford, Mass.

97,092.—PANELING MACHINE. — Nicholas Jenkins, New York city.

97,093.—PLATE LIFTER AND BREAD TOASTER.—T. D. Keith Mayville, Wis.

97,094.—FIRE PLACE STOVE.—Philip Klotz, Baltimore, Md.

97,095.—MACHINE FOR WINDING THREAD ON BOBBINS, ETC.—L. J. Knowles, Warren, Mass.

97,096.—LATHE FOR TURNING OVALS.—Ramsey Lawson Shelburne Falls, Mass.

97,097.—FLUID METER.—H. B. Leach, Boston, Mass.

97,098.—GRINDSTONE. — Thomas Loring, Blackwoodtown N. J.

97,099.—COMBINATION POCKET RULE. — Joel Manchester New York city.

97,100.—AERIAL STEAM CAR.—Fred. Marriott, San Francisco Cal.

97,101.—COMBINED BED AND MUSICAL INSTRUMENT BOARD.—John McDonald, New York city.

97,102.—STUMP EXTRACTOR. — Alex. McLeod, Black River Falls, Wis.

97,103.—CHURN.—Friedrich Miller, Frostburg, Md.

97,104.—HARROW.—J. H. Miller and F. A. Pickering, Niantic Ill.

97,105.—WATER CLOSET.—G. R. Moore, Philadelphia, Pa.

97,106.—POWER LOOM FOR WEAVING INGRAIN CARPETS.—Wm. Murkland and J. W. Murkland, Lowell, Mass.

97,107.—TIRE-BENDING MACHINE.—John Naugle, Moresville, Ind. Antedated Nov. 10, 1869.

97,108.—COVERING FOR STEAM BOILERS.—Chas. M. O'Hara, New York city.

97,109.—HAND CORN SHELLER.—Chas. M. O'Hara, Bolivar, Tenn.

97,110.—VELOCIPEDE. — Joseph Ives Pease, Stockbridge, Mass.

97,111.—FIFTH WHEEL FOR CARRIAGES.—J. A. Peck (assignor to himself and W. L. White, Jr.), Taunton, Mass.

97,112.—SAW MILL.—Wm. Penny, Milton, Fla.

97,113.—BENDING MACHINE.—David Pierce, Almont, Mich.

97,114.—DERRICK.—J. W. Piper, Chicago, and W. J. Hanger and J. S. Hanger, Taylor, Ill.

97,115.—MACHINE FOR MAKING WHEELS.—Thomas Place, Alfred Centre, N. Y.

97,116.—SUSPENDER.—T. O. Potter, Boston, Mass.

97,117.—MACHINE FOR ROLLING BARS FOR HORSESHOES.—Abram Reese, McClure township, Pa.

97,118.—HORSESHOE MACHINE.—Jacob Reese and A. Reese, Pittsburgh, Pa.

97,119.—WEIGHING BASKET.—C. Renne and F. Landenberger, New York city.

97,120.—PAPER-CUTTING MACHINE.—Thomas C. Robinson, Boston, Mass.

97,121.—COMBINED PLANTER AND CULTIVATOR.—J. A. Rockwood (assignor to himself and S. Morris), Kinderhook, Ill.

97,122.—PORTABLE GAS APPARATUS AND CARBURETER.—M. A. Root, Philadelphia, and J. D. Custer, Norristown, Pa.

97,123.—SECURING THE CANNON PINIONS OF WATCHES.—E. Sandoz, Hudson City, N. J. Antedated Nov. 15, 1869.

97,124.—BEEHIVE.—Riley Sanford, Marion, N. Y.

97,125.—FLUTING MACHINE.—H. C. Sergeant, Newark, N. J.

97,126.—MOWING MACHINE.—W. H. Seymour, Brockport, N. Y.

97,127.—PADLOCKS.—Thomas Slaight, Newark, N. J.

97,128.—WORK BOX AND DESK.—C. W. Small, Worcester, Mass.

97,129.—DEVICE FOR PACKING EGGS FOR TRANSPORTATION.—A. S. Smith, Lawrence, Mass.

97,130.—APPARATUS FOR BUILDING SOD FENCES.—Cyrus W Smith, Morrisville, N. Y.

97,131.—APPARATUS FOR MANUFACTURING CHEESE.—P. W. Strong, Evans' Mills, N. Y.

97,132.—STAIR ROD.—Josef Stuehler, Brooklyn, N. Y.

97,133.—BUCKLE.—H. R. Swan, Norwalk, Conn. Antedated Nov. 8, 1869.

97,134.—BALANCING MILLSTONE. — George S. Thompson, Philadelphia, Pa.

97,135.—CLOSE STOOL AND CLOSET.—C. True, Pecatonica, Ill.

97,136.—WINDMILL.—W. I. Tustin, San Francisco, Cal.

97,137.—SEEDING MACHINE.—W. A. Van Brunt, Horicon, Wis

97,138.—REVOLVING SCALE.—Hermann Von Schlagintweit-Sakunlunski, Munich, Bavaria.

97,139.—CORN PLANTER.—D. F. Wagner, West Hanover, Pa.

97,140.—PAPER-CUTTING MACHINE.—F. L. Walker, Boston, Mass.

97,141.—MACHINE FOR MAKING NAILS FOR HORSESHOES.—Wm. Wickersham, Boston, Mass.

97,142.—WAGON LADDER.—Isaac Williams, Bucyrus, Ohio.

97,143.—PROCESS OF BREWING BEER.—Chas. Abresch, New York city.

97,144.—Isaac Adams, Jr.—Suspended.

97,145.—CURING AND PRESERVING FISH.—R. A. Adams, Cambridge, Mass.

97,146.—PROPELLING APPARATUS.—J. F. Alexander, New York city.

97,147.—SPINDLE FOR LOOM SHUTTLES.—N. I. Allen and J. C. Moody, Brunswick, Me.

97,148.—STEP LADDER.—E. R. Austin, Elmira, N. Y.

97,149.—CONCRETE PAVEMENT.—D. W. Bailey, Chelsea, Mass.

97,150.—SLEIGH.—S. R. Bailey, Bath, Me.

97,151.—MACHINE FOR SAWING SHINGLE BOLTS.—D. H. Ball, Sinnamahoning, Pa.

97,152.—KNIFE AND FORK.—James Ball, Brooklyn, N. Y.

97,153.—PROGRESSIVE RECIPROCATING MOTION FOR STAMPING AND OTHER MACHINES.—R. L. Barclay, Brooklyn, E. D., N. Y.

97,154.—POCKET KNIFE—F. H. Barnard and W. L. Brace, Hartford, Conn.

97,155.—CONFECTION FROM RAISINS.—Joseph B. Bidwell, Grand Rapids, Mich., assignor to himself and J. C. Knoblock, South Bend, Ind.

97,156.—METHOD OF FORMING SLEEVE BUTTON SHANKS.—W. H. Blake, Waterbury, Conn.

97,157.—HORSE RAKE.—Olpha Bonney, Jr., San Francisco, Cal.

97,158.—LOOM.—J. L. Branson, Pittsburgh, Pa.

97,159.—SAFE.—Martin Briggs, Rochester, N. Y.

97,160.—PIPE TRAP.—C. H. Burleigh, Worcester, Mass.

97,161.—BEE-MOTH INSTRUMENT.—R. P. Buttles, Mansfield Pa.

97,162.—PLOW.—F. M. Caldwell, New York city.

97,163.—RAILWAY FROG.—F. J. Calhoun, Boston, Mass.

97,164.—DITCHING MACHINE.—Henry Carter, Cleveland, Ohio.

97,165.—SYRINGE.—P. F. Cederholm, Stillwater, Minn.

97,166.—EXTENSION BIT.—H. P. Chapman, Essex, assignor to the Centre Brook Manufacturing Company, Centre Brook, Conn.

97,167.—BREECH-LOADING FIRE-ARM.—A. A. Chassepot, Paris, France.

97,168.—FRUIT-DRYER.—W. R. Clark, Indianola, Ill.

97,169.—BAG FOR GUANO, PHOSPHATES, AND OTHER FERTILIZERS.—B. R. Croasdale, Philadelphia, Pa.

97,170.—BALING PRESS.—William Deering, Louisville, Ky.

97,171.—HORSE HAY FORK.—J. J. De Grummond, Knoxville, Ill.

97,172.—HAY RACK.—Geo. Denis and Geo. Grassal, Osceola, Iowa.

97,173.—MACHINE FOR MAKING CHAINS.—Wm. Dennison, Cambridge, Mass.

97,174.—FRUIT DRYER.—Elias Dilday, South Pass, Ill.

97,175.—LOOM.—Geo. Duckworth, Wm. Duckworth, James Duckworth, and J. C. Duckworth, Pittsfield, Mass.

97,176.—VELOCIPEDE WHEEL.—Wright Duryea, Glen Cove, N. Y. Antedated Nov. 12, 1869.

97,177.—CARPENTERS' GROOVING PLANE.—Theodore Duval, Hartford, Conn.

97,178.—MACHINE FOR POUNCING HATS.—Rudolph Eickemeyer, Yonkers, N. Y.

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97,179.—CHURN.—E. R. Embry, Richmond, Ky.
97,180.—LINIMENT.—E. C. Evens, Forrest Hill, Ind.
97,181.—DINNER PAIL.—J. O. Fairbairn, Milwaukee, Wis.
97,182.—MODE OF RECOVERING THE SPENT ACID FROM OIL REFINERIES.—L. S. Fales, New York city, assignor to the American Fertilizer Company.
97,183.—DITCHER AND GRADER.—E. L. Foreman (assignor to Edward Foreman), Rantoul, Ill. Antedated Nov. 15, 1869.
97,184.—VEGETABLE CUTTER.—Warren Gale, Peekskill, N. Y.
97,185.—PRINTING PRESS.—Merritt Gally (assignor to A. P. Carpenter), Rochester, N. Y.
97,186.—INDICATOR FOR MAIN-SPRING OF WATCHES.—Joseph Gardner, Jr., Boston, Mass.
97,187.—LOOSE GRAIN FORK.—Hiram Gary, Croton, N. J.
97,188.—MOLDING MACHINE.—A. S. Gear, New Haven, Conn.
97,189.—PAPER FELT OR WADDING.—W. W. Glentworth, Philadelphia, Pa., and W. H. Gandey, Lambertville, N. J.
97,190.—MACHINE FOR NAILING SHOE-SOLES WITH WIRE.—Louis Goddu (assignor to Elmer Townsend), Boston, Mass.
97,191.—MACHINE FOR NAILING SHOE-SOLES WITH WIRE.—Louis Goddu (assignor to Elmer Townsend), Boston, Mass.
97,192.—MACHINE FOR NAILING SHOE-SOLES WITH WIRE.—Louis Goddu (assignor to Elmer Townsend), Boston, Mass.
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97,206.—COMPOSITION BOOT AND SHOE HEEL.—Frank Marquard, Newburyport, Mass.
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97,208.—CAR COUPLING.—Charles Maus, Danville, Pa.
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97,231.—RECIPROCATING STEAM ENGINE.—John B. Root, New York city. Antedated November 12, 1869.
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97,246.—LANTERN.—Nathan Thompson, Brooklyn, E.D., N. Y. Antedated November 10, 1869.
97,247.—GAS MACHINE.—Howard Tilden, Boston, Mass.
97,248.—ANIMAL TRAP.—Robert Tompkins, Clarksville, Tenn.
97,249.—MACHINE FOR NAILING SHOE SOLES WITH WIRE.—Elmer Townsend, Boston, and Louis Goddu, Lowell, Mass.
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97,252.—DUMPING MACHINE.—Benjamin Walton, Harrisburg, Ill.
97,253.—SCALE BEAM.—John Weeks, Buffalo, N. Y. Antedated November 9, 1869.
97,254.—MACHINE FOR POLISHING WOOD.—Daniel Westley (assignor to himself and E. W. Buss), Corry, Pa.
97,255.—CIGAR MACHINE.—John Wettstein (assignor to himself and John Thomas Hennaman), Baltimore, Md.
97,256.—SHUTTLE SPINDLE.—Henry H. Wheeler and Oliver H. Reed, Lowell, Mass.
97,257.—COMBINED COTTON AND CORN PLANTER.—A. R. Wiggs, Iuka, Miss.
97,258.—CURRY COMB.—Judson E. Yager, Barboursville, Va.
97,259.—PLANT PROTECTOR.—J. M. Watson, Sharon, Mass.
97,260.—WIRE FOR FASTENING SOLES TO SHOES, ETC.—Wm. Wickersham, Boston, Mass.
97,261.—DEVICE FOR RELEASING STANDING RIGGING.—Frederick Wittram, San Francisco, Cal.
97,262.—LUBRICATING COMPOUND.—Cyrus S. Moore, Erie, Pa.

REISSUES.

94,058.—MECHANICAL VELOCIPEDE.—Dated August 24, 1869; reissue 3,739.—Arthur M. Allen, New York city.
63,220.—SOLDERING MACHINE.—Dated March 26, 1867; reissue 3,740.—Edward T. Covell, Brooklyn, N. Y.
55,658.—MACHINE FOR PRESSING AND MOLDING PLIABLE MATERIALS.—Dated June 19, 1866; reissue 3,741.—George C. Howard, Philadelphia, Pa.
90,549.—APPARATUS FOR DRYING SUGAR AND OTHER LIKE ARTICLES.—Dated May 25, 1869; reissue 3,742.—Gustavus A. Jasper, Charlestown Mass.
41,929.—BOLT-MAKING MACHING.—Dated March 5, 1864; reissue 3,251, dated January 5, 1869; reissue 3,743.—William J. Lewis, Pittsburgh, Pa.
74,613.—MANUFACTURE OF TIN-LINED LEAD PIPE.—Dated February 18, 1868; antedated February 6, 1868; reissue 3,744.—Peter Naylor, New York city, assignee of Wm. Anthony Shaw.
57,195.—HAND SCREW CLAMP.—Dated August 14, 1866; reissue 3,745.—Hermann Schmidt, New York city.
79,040.—WIRE SPRING MATTRESS.—Dated June 16, 1868 Patented in Saxony, March 6, 1865; reissue 3,746.—The Woven-wire Mattress Company, Hartford, Conn., assignees, by mesne assignments, of Franz Rudolph Wegman.
42,520.—LANTERN.—Dated April 26, 1864; reissue 3,747.—Wm. Westlake, James F. Dane, and John P. Covert, Chicago, Ill., assignees of Wm. Westlake.

DESIGNS.

3,756 and 3,757—CENTER PIECE.—Henry Berger, New York city. Two patents.
3,758.—SCHOOL DESK.—P. Born, Selin's Grove, Pa.
3,759.—GLASS WARE.—John Bryce, East Birmingham, Pa.
3,760.—PITCHER.—John Fleming and John Hamilton, Pittsburgh, Pa.
3,761.—PLATE OF A COOKING STOVE.—Luther W. Harwood (assignor to Fuller, Warren & Co.), Troy, N. Y.
3,762.—COFFIN.—Samuel Hillier, Allegheny, Pa.
3,763.—STOVE.—R. P. Myers, B. F. Rouse, and J. M. Osborn, Cleveland, Ohio.
3,764.—BORDER FRAME OF A FIRE-PLACE.—J. R. Rose and Edward L. Caley, Jr., Philadelphia, Pa., assignors to Wm. E. Wood & Co., Baltimore, Md.
3,765.—FIRE-PLACE STOVE.—J. R. Rose and Edward L. Caley, Jr., Philadelphia, Pa., assignors to William E. Wood & Co., Baltimore, Md.
3,766.—FORK OR SPOON HANDLE.—George Sharp, Philadelphia, Pa.

APPLICATIONS FOR EXTENSION OF PATENTS.

HORSE RAKE.—Nathan Martz, of Berwick, Pa., has applied for an extension of the above patent. Day of hearing Feb. 9, 1870.

PRESSURE BELLS.—Margarette L. Barton and Charles A. Buell, of Chatham, Conn., administrators of the estate of Jason Barton, deceased, have petitioned for the extension of the above patent. Day of hearing March 23, 1870.

PROCESS AND APPARATUS FOR COOLING BEER AND OTHER LIQUIDS.—Jean Louis Beaudelot, of Harancourt, Empire of France, has applied for an extension of the above patent. Day of hearing, March 30, 1870.

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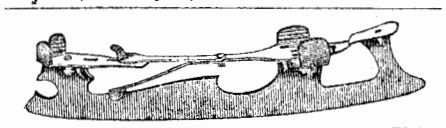

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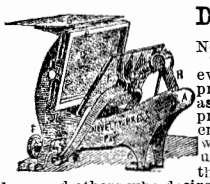

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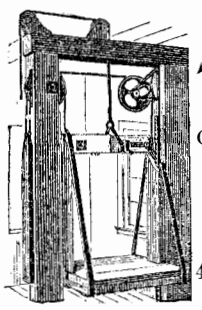

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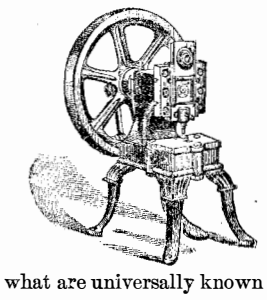

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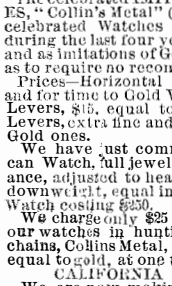

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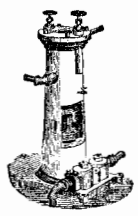

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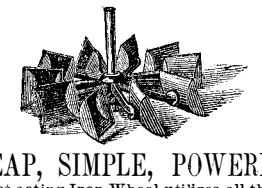

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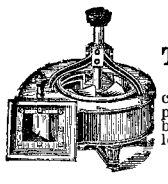

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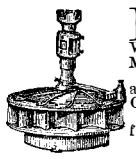

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